National Library of Canada
Bibliothèque nationale du Canada

Canadian Theses Service
Service des thèses canadiennes

Ottawa, Canada
K1A 0N4

NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Previously copyrighted materials (journal articles, published tests, etc.) are not filmed.

Reproduction in full or in part of this microform is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

Les documents qui font déjà l'objet d'un droit d'auteur (articles de revue, tests publiés, etc.) ne sont pas microfilmés.

La reproduction, même partielle, de cette microforme est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30.

NL-339 (r. 88/04)

Canada

THE UNIVERSITY OF ALBERTA

IMPACT OF FREE TRADE ON THE ALBERTA EGG INDUSTRY

by

WARD W. TOMA

©

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF SCIENCE

IN

AGRICULTURAL ECONOMICS

DEPARTMENT OF RURAL ECONOMY

EDMONTON, ALBERTA

FALL 1988

Permission has been granted to the National Library of Canada to microfilm this thesis and to lend or sell copies of the film.

The author (copyright owner) has reserved other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without his/her written permission.

L'autorisation a été accordée à la Bibliothèque nationale du Canada de microfilmer cette thèse et de prêter ou de vendre des exemplaires du film.

L'auteur (titulaire du droit d'auteur) se réserve les autres droits de publication; ni la thèse ni de longs extraits de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation écrite.

ISBN 0-315-45676-0

THE UNIVERSITY OF ALBERTA

RELEASE FORM

NAME OF AUTHOR WARD W. TOMA

TITLE OF THESIS IMPACT OF FREE TRADE ON THE ALBERTA EGG INDUSTRY

DEGREE FOR WHICH THESIS WAS PRESENTED MASTER OF SCIENCE

YEAR THIS DEGREE GRANTED FALL 1988

Permission is hereby granted to THE UNIVERSITY OF ALBERTA LIBRARY to reproduce single copies of this thesis and to lend or sell such copies for private, scholarly or scientific research purposes only.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

(SIGNED) .....

PERMANENT ADDRESS:

Box 36, HAIRY HILL

ALBERTA, T0B 1S0

.....

DATED Oct 6 1988

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled IMPACT OF FREE TRADE ON THE ALBERTA EGG INDUSTRY submitted by WARD W. TOMA in partial fulfilment of the requirements for the degree of MASTER OF SCIENCE in AGRICULTURAL ECONOMICS.

.....

Supervisor

.....

.....

.....

Date..... Oct 6, 1988 .....

Abstract

The objectives of this study were 1) to use the industrial organization framework of market analysis to describe the historical and current market aspects of the Alberta and United States table egg sectors, and 2) to assess the impacts free trade in table eggs between Alberta and the United States may have on the Alberta table egg market. The objectives were established in view of the concern raised by the Alberta table egg industry over the actions taken by Canada and the United States in their attempt to establish a free trade area, and in light of a view existing in the international community that institutions within countries allowing quantitative import restrictions should be changed so as to lower or eliminate the level of protectionism in the international community.

Using Bain's (1959) industrial organization paradigm, the historical and current market aspects of structure, conduct, and performance of the United States and Alberta table egg sectors were examined.

If free trade in table eggs were instituted between Alberta and the United States, elements of the Alberta market may change. The method of price determination, would change from an governmentally administered price to a price which may be a function of the U.S. farmgate price. Due to the integration in the U.S. market eggs produced in Alberta may not be able to enter the United States. Quality differences and producer integration into wholesale may hinder the flow of U.S. eggs into Alberta. However, the potential would still be there. As such, the price level in Alberta would become a function of the U.S. farmgate price, lower than the price level which exited under supply management, and as such may not return to all producers their cost of production, causing a decrease in the gross revenue accruing to the table egg sector. Those producers who would not have their cost of production met by an open market price would be forced to leave the industry. As the majority of quota egg production in Alberta occurs on mixed farm operation, this transition may be eased and the number of producers forced out of agriculture may not be as high. Those producers able to achieve some degree of economies of scale may be able to compete at a lower prices and may be the major source of domestically produced table eggs.

As the Alberta farmgate price decreases, the producers share of retail price would decline only if the retail price does not decline proportionally. This may occur under free trade due to the oligopolistic/oligopsony and the vertical integration present in the wholesale stage. If this occurs, the consumer may not benefit from the lower prices free trade may cause at farmgate.

Other aspects of market structure may be enhanced under free trade. Free entry into production would ensure least cost and efficient production, thus allowing for increased resource allocation. While a decrease in price would increase quantity demanded, because of the inelasticity of demand, the price decrease would outweigh the increase in quantity demanded, causing an overall decrease in total producer revenues.

Acknowledgements

In the writing of this thesis I was aided by many people, all of whom are owed thanks. My supervisor, Dr. Murray Hawkins, deserves a giant lump of thanks for all of the help that he has given me throughout my time here. It is quite possible that I would still be going in circles without his guidance. I would also like to thank the other members of my committee, Dr. Lerohl, Dr. Robinson and Mr. Warren Chorney for their aid, assistance, and the answering of many questions.

I am indebted to the ladies in the library, Barb and Hildegard, for their uncanny ability to find any reference I needed, sometimes when I wasn't sure what I wanted. I would also like to thank the front office staff of Wendy, Holly and Ruth and Reg for putting up with my many requests. The computing staff, Jim, Clare, and Judy, also helped me greatly in computing assistance. You are all greatly appreciated.

The folks who shared offices with me are owed many, many thanks for putting up with me during an insane time. Naming names would take up far too much space, however, I must say that being part of the social epi-center helped greatly, you know who you are.

A final thanks to my parents and family for their aid and support, it helped a lot.

Table of Contents

Chapter	Page
I. Introduction	1
A. Background	1
B. Problem	2
Objectives	4
Scope and Limitations	4
Elements of Industrial Organization	4
Data Sources	7
Study Outline	7
II. The Alberta and United States Table Egg Markets	8
A. The Structure of the Alberta Table Egg Market	8
Seller Concentration	8
Buyer Concentration	12
Barriers to Entry an Exit	13
Growth	14
Product Differentiation	17
B. Conduct in the Alberta Egg Market	17
Pricing	17
Vertical Integration	23
Entry Policies	23
C. Performance of the Alberta Egg Market	23
D. The Structure of the U.S. Egg Industry	25
Seller Concentration	25
Buyer Concentration	26
Barriers to Entry and Exit	28
Growth	29
Product Differentiation	29

E. Conduct in the U.S. Egg Market 31
Pricing 31
Integration 32
Marketing Orders 33
F. Performance of the U.S. Egg Market 34
III. Analysis of Free Trade in Table Eggs Between Alberta and the United States 36
A. Pricing 36
B. Structural Characteristics 38
Seller Concentration 38
Buyer Concentration 42
Entry and Exit Conditions 46
Product Demand 46
Technology 47
Product Differentiation 47
Summary 47
IV. Summary, Conclusions and Recommendations 49
A. Review of Objectives 49
B. Summary of the Market Analysis 49
Alberta 49
The United States 50
C. Conclusions of the Impacts Resulting From Free Trade 51
D. Recommendations for Further Research 53
Bibliography 54
Appendix A 60
Appendix B 63
Appendix C 69

List of Tables

Table		Page
I.1	Canadian Global Import Quotas for Shell and Processed Eggs. 1987	3
I.2	Canadian Imports of Shell Eggs by Country of Origin. 1976-1986	3
II.1	Egg Producers and Flock Sizes in Alberta. 1976-1986	9
II.2	Number of Quota Egg Producers and the Percentage of Producers that are Hutterite Colonies, by Region, in Alberta. 1976-1987	12
II.3	Alberta's Trade in Eggs. 1977-1986	15
II.4	Consumption of Eggs in Alberta. 1977-1986	16
II.5	Grades and Standards for Canadian Eggs	18
II.6	U.S.A. Table Egg Production, Consumption, and Trade Surplus. 1976-1986	31

List of Figures

Figure		Page
II.1	The Size Distribution of Alberta Egg Producers. 1976-1987	10
II.2	The Geographical Locations of Producer Regions in Alberta	11
II.3	Weighted All Grade Price For Eggs, Alberta. 1977-1986	25
II.4	Regional Distribution of the U.S.A. Laying Flock. 1975-1987	27
II.5	U.S.A. Per Capita Consumption of Eggs and Egg Product. 1970-1986	30
II.6	U.S.A. Average Farmgate Price. 1977-1987	35
III.1	Average U.S. Farmgate Price and the Average Alberta Cost of Production, in Canadian Dollars. 1977-1987	39
III.2	The Difference Between the U.S. Farmgate Egg Price and the Alberta Cost of Production. 1977-1987	40
III.3	Average Producer and Wholesale Shares of Retail Table Egg Prices, Alberta. 1981-1987	44
III.4	Average Producer and Wholesale Shares of Retail Table Egg Price, U.S.A. 1981-1987	45

I. Introduction

A. Background

Those agricultural marketing boards which, through supply management regulations manage the production of their respective commodities, have created sectors in the Canadian agricultural economy which are somewhat isolated from the international market. The Canadian table egg sector has become an example of the autarky created by these policies. Imports of table eggs and processed egg products have been kept at a minimum through the use of quantitative import restrictions.

These supply management regulations have been allowed under the General Agreement on Tariffs and Trade (GATT), which states in Article XI:(1) that "no prohibitions or restrictions other than duties, taxes or other charges, whether made effective through quotas, import or export licences or other measures, shall be instituted or maintained." [1] However, Article XI:(2)(c)(i) exempts from the general prohibition "import restrictions on any agricultural or fisheries product, imported in any form, necessary to the enforcement of governmental measures which operate to restrict the quantities of like domestic product to be marketed or produced."[2] Thus, as Canada has in place a system of supply management which restricts the amount of table eggs produced, imports have been restricted through the use of quantitative import quotas. Furthermore, under the GATT agreement a country shall maintain its historical trade relationships and quantitative import restrictions cannot reduce imports "such as will reduce the total imports relative to the total of domestic production; as compared with the proportion which might reasonably be expected to rule between the two in the absence of restrictions."[3]

The current level of the import quota for Canada, shown in Table I.1, is a small proportion of Canada's table egg production. The majority of Canada's imports originate in

---

[1]Dam, Kenneth W., *The GATT: Law and Economic Organization*. The University of Chicago Press, 1970, Pg. 407.
[2]Ibid
[3]Ibid, pg. 408

the United States (U.S.), as shown in Table I.2.

There has been a view in the international community that the institutions within countries which allow quantitative restrictions should be changed so that the level of protectionism in the international economy would become lower or perhaps eliminated. The recent negotiations between Canada and the United States which have attempted to establish a free trade area is an example of this feeling.

The United States has proposed a reformation of international agricultural trade through the elimination of all agricultural subsidies and import barriers. This proposal was made at the Uruguay Round of GATT negotiations (Warley 1987). The fact that such a proposal was made indicates the negative feelings of the U.S. Administration towards import restricting policies. If such negotiations are successful in eliminating import restrictions, the supply management system in Canada would be affected.

Since the table egg production sector in Alberta has been regulated by a supply management system, this thesis will attempt to estimate the changes which might occur to the Alberta egg sector with the implementation of trade liberalization and the subsequent demise of supply management.

B. Problem

The problem examined in this study is the impact that trade with the United States in shell and processed eggs would have on the Alberta shell egg production and processing sector. Warley and Barichello (1985) hypothesized that at the farm level in Canada, egg production would shift to large production units, capable of competing with the imports. They also estimated that those producers who currently have high input costs would not be competitive in a free trade situation, along with those producers carrying a high debt load. Their conclusion was that in the short run, rationalization causing noncompetitive producers to leave the industry would occur, thus leaving the industry with fewer, larger, more efficient producers in those areas of Canada where eggs may be produced at competitive costs. Storey (1986) estimated that the loss of price control which would accompany free trade, would

Table I.1: Canadian Global Import Quotas for Shell and Processed Eggs. 1987

Commodity	unit	Percent*
Shell eggs	doz.	0.675
Frozen eggs	lb.	0.415
Dried eggs	lb.	0.615

* Percent of previous years domestic production.

Source: AEFMB, Personal Communication, 1987

Table I.2: Canadian Imports of Shell Eggs by Country of Origin. 1976-1986

Years	Quantity*		
1976	505,620 USA	3,914 Israel	18,764 Finland
1977	256,290 USA		
1978	405,117 USA	1,600 England	
1979	704,500 USA	67,530 Other	
1980	390,950 USA		
1981	286,585 USA		
1982	483,050 USA		
1983	318,203 USA		
1984	406,536 USA		
1985	674,570 USA		
1986	539,442 USA		
1987	439,826 USA	2,092 Hong Kong	

* Boxes of 15 Dozen

Source: Agriculture Canada, *Poultry Market Review*, Annual, 1976-1987

cause the price of eggs in Canada to fall by 20 to 25 percent. Scearce and Ikerd (1987) concluded that most Canadian poultry producers would not be able to produce at the lower prices trade would cause and that these producers would be forced to find alternative uses for their labor and resources.

Objectives

The primary objectives of this thesis are to:

1. *describe the historical and current structural characteristics of the Alberta and United States shell egg production and processing sectors and hypothesize as to what these characteristics would be in Alberta upon the start of Alberta-US trade in table eggs and the associated loss of supply management.*
2. *to determine the historical and current pricing practices of the Alberta and United States shell egg markets and to hypothesize as to the price of eggs in the Alberta shell egg market in the event of trade between Alberta and the U.S.A. in table eggs.*
3. *to examine elements of market performance in the Alberta and United States shell egg markets and to hypothesize how the market performance in Alberta would be affected by the imposition of Alberta-US free trade in table eggs.*

Scope and Limitations

The scope of the industrial organization analysis will involve Alberta and the United States. The analysis to hypothesize changes to structural, conduct and performance variables will be done on the Alberta market. This study, as it pertains to the production aspect of the shell egg sector, will concentrate on the producer-wholesaler (farmgate) interface.

In the free trade scenario it will be assumed that the present quantitative restrictions on the importation of shell and processed eggs will be eliminated, placing the Canadian egg production industry in a state of competition. Moreover it will be assumed that those institutions with the power to control the production, marketing and movement of eggs in Canada will lose any influential powers.

Elements of Industrial Organization

Caves tells us that the theory of industrial organization is such that the structure or environment of a market can determine the conduct or behavior of the participants of the market, and that it is the interaction of these aspects which determine the performance of a

market (Caves 1982). Bain (1959) listed the structure and the conduct of market participants as the determinants of market performance. However, the causation is not one way, conduct and performance can react back on structure (Shepherd 1979). Shepherd (1979) tells us that the field of industrial organization is concerned with two ideas:

1. the functioning of enterprises within a variety of market structures, and
2. how the outcomes of market performance fit the public interest.

Shepherd also indicates that the condition of market functions or the structure and conduct elements, are positive in nature. Being positive, these elements can be measured to describe the present and historical aspects of structure and conduct. However, market performance is not a positive but a normative element. As such, with the positive knowledge of structure and conduct, problems of performance may be judged against what ought to exist (Shepherd 1979).

Those aspects of a market which determine its structure are those features which are relatively stable and have an influence on the competitiveness of the market (Caves 1982). Basic characteristics of market structure are:

1. the levels of buyer and seller concentration,
2. the conditions affecting entry and exit of firms,
3. the extent of product differentiation, and
4. the nature and rate of product demand growth.

Measurements of seller and buyer concentration are useful for examining the degree of control which may be present in the market. The ability with which a firm may enter or exit a market is indicative of the degree of relative advantage possessed by established firms. When entry conditions are tightly controlled, the possibility of abnormally high profits exists. Conditions of exit generally tend to be regulatory in nature, although very large fixed investment costs may dissuade exit. Product differentiation may be associated with both high levels of seller concentration and restricted entry conditions. However, the nature of the product at hand may limit possibilities of product differentiation. An examination of technical advancement and the rate of absorption may indicate the degree of competition present in the

market. Perfectly competitive industries tend to adopt new technology the fastest, however rivalistic oligopolies may generate innovation faster. The conditions of demand (elasticities) contribute directly over time to price, output, and revenue positions. Changes in demand over time can have an influence both conduct and performance, whether the changing force is internal or external.

The conduct of a market or of market participants, may at times be difficult to distinguish from structural elements. This can occur because structural elements, can to a certain degree, predict conduct. However there are two market conduct characteristics which are distinguishable from structural elements: dependencies among sellers, and policies of pricing and product disposal. Dependencies can be defined as patterns or evidence of seller coordination, either overtly or covertly. Pricing and product disposal policies can easily be influenced by such dependencies. The policies which are of major importance are promotional in nature and policies which determine the principles and methods of arriving at output and prices. Although these two measures appear to be related to structural aspects, they are different in that their affect can only be examined over time while structural variables may be examined at a point in time.

Market performance are those end results of a firm's policies and the processes of adjustment to its rival's actions in a particular market (Bain 1959). The ideal results would be for a market to deliver the quantity and quality of product at the time and place which maximizes the benefit to society from the resources allocated (Marion 1986). This is a perfect result and the best a system can perform is to maximize social benefit given the knowledge and information present at the time resource allocation decisions are made.

In agriculture, efficiency measures are often used to indicate the performance level of a market. Measures of efficiency, which are the ratios between outputs and inputs, are compared with the optimum ratios which could be obtained from the best possible use of resources.

Market efficiency may be divided into operational and pricing efficiency in a market. Operational efficiency refers to how the physical aspects of marketing are performed. These

aspects include transportation, storage, processing and distribution. Pricing efficiency refers to how well the activities in the market channel are coordinated so that the price at each stage reflects the actual cost of the added utility. There are several dimensions of a market which may have an effect on either the operational or pricing efficiency of that market. These dimensions may be examined to see if they are affecting either aspect of efficiency in the market.

Data Sources

The data used in this analysis are mainly secondary in nature. The data were collected from Alberta Agriculture, the AEFMB, various Statistics Canada and United States Department of Agriculture publications, and Agriculture Canada, along with information collected in personal interviews of industry members.

Study Outline

The thesis is organized so that a review of the structure,conduct, and performance of the Alberta and United States egg sectors is presented in Chapter Two. Chapter Three presents an analysis of trade affects and Chapter Four contains the conclusions and recommendations for further study.

II. The Alberta and United States Table Egg Markets

A. The Structure of the Alberta Table Egg Market

Seller Concentration

The Alberta table egg production sector has been characterized by increasing levels of concentration. The data in Table II.1 illustrates the declining numbers of both quota holding and exempt producers of eggs between 1976 and 1987. The number of quota producers has been decreasing over time as indicated by the negative trend (Table II.1). The decline in the number of producers may be attributed to retirement of egg producers and the out-migration of inefficient producers. While the number of farmers declined, the provincial flock did not, giving rise to an increase in the average quota flock size of 4,314 layers per farm in 1976 to 6,163 layers per farm in 1987. Exempt producers have not experienced as rapid an increase in flock size, due to regulations imposed in 1969 which limited the amount of layers an exempt producer may have to 200. This level was increased to 300 in 1977. These regulations have not limited the amount of exempt producers, however the numbers of exempt producers has also declined between 1976 and 1987, although not at a rate comparable to that of quota producers.[4]

The size distribution of quota holding producers has changed over time. In 1976, 41.9 percent of quota holding egg producers had less than 1,249 layers, and 88.7 percent had less than 10,000 layers (Figure II.1). In 1987, while the majority of producers held less than 10,000 layers (Figure II.1), with the largest size range between 2,500 and 9,999 layers.

The proportion of Alberta's egg production quota held by Hutterite colonies has been increasing. In 1987, Hutterite colonies accounted for 43 percent of Alberta's total quota producers which is larger than the 26 percent of producers the Hutterite colonies accounted

[4]The data in Table II.1 presenting the numbers of exempt producers and the birds held by them were obtained from the AEFMB. However the data on the numbers of exempt producers are those exempt producers registered with the AEFMB, while the estimate of exempt birds originates from Statistics Canada. As such the average exempt birds per exempt producer may be slightly inflated.

Table II.1: Egg Producers and Flock Sizes in Alberta. 1976-1986

Years	Quota Producers	Exempt Producers	Quota Birds	Exempt Birds	Quota Birds/Farm	Exempt Birds/Farm
1976	334	1,500	1,440,934	666,207	4,314	444
1977	307	1,876	1,624,567	396,792	5,291	211
1978	293	1,814	1,547,461	428,786	5,210	236
1979	266	1,745	1,638,039	428,786	6,158	245
1980	265	1,723	1,650,535	428,786	6,228	248
1981	265	1,775	1,676,795	418,000	6,327	235
1982	259	1,608	1,566,635	418,000	6,048	259
1983	253	1,568	1,563,872	418,000	6,181	266
1984	253	1,596	1,564,565	427,000	6,184	267
1985	248	1,514	1,483,887	427,000	5,983	282
1986	240	1,542	1,479,310	427,000	6,163	276
1987	230	1,607	1,453,977	427,000	6,537	265
Trend*	-7.68	-18.55	-8203.70	-8437.70	+122.55	-3.03

* The slopes of the trend coefficients are presented in Appendix A.

Source: AEFMB Unpublished Data, 1987

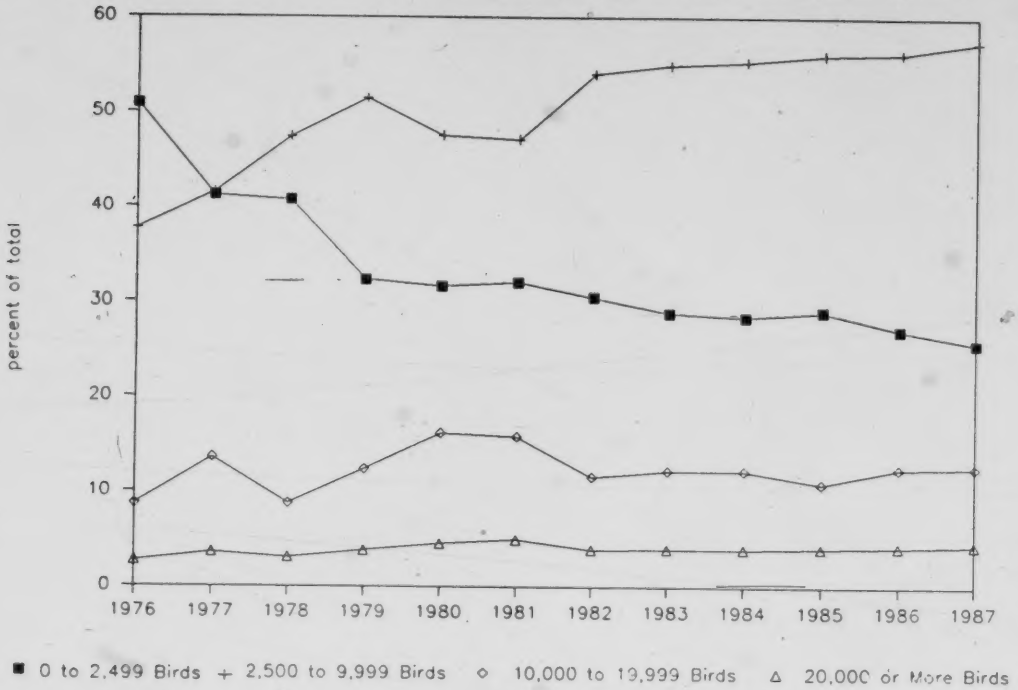
for in 1976 (Table II.2). However, the increased concentration has not been due to increasing numbers of Hutterite colonies holding quota, but from the decreasing numbers of quota producers.

Within Alberta, table egg production has located mainly in the southern portions of the province. As shown in Table II.2, region 2 (Figure II.2) has historically contained the largest number of quota holding producers. Region 1 has historically been the second largest region in the province. These two regions accounted for 52.2 percent of Alberta's quota holding egg farms in 1987. Some regions, such as 4 and 5, have experienced a larger loss of farms than other regions since 1976. The southern regions have had higher levels of Hutterite colonies (Table II.2), with the production in regions 1 and 3 being primarily Hutterite colonies.

Vertical integration at the producer level has been limited. There has been integration into processing, with producers owning 14 of the 18 grading stations in Alberta by 1986, but there has been no integration into production by hatcheries or feed companies[5]

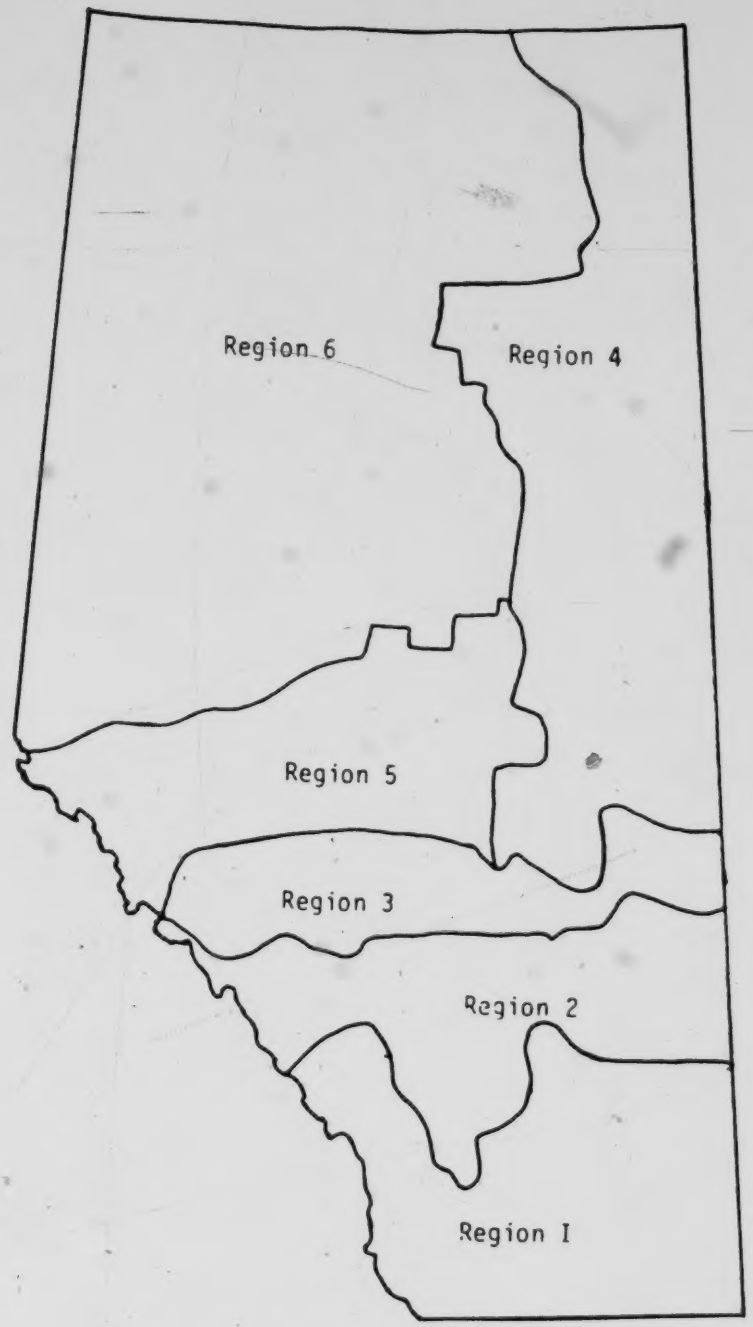
[5]AEFMB, Personnal Communication, 1987.

Figure II.1: The Size Distribution of Alberta Egg Producers. 1976-1986



Source: AEFMB, Unpublished Data, 1987

Figure II.2: The Geographical Location of Producer Regions in Alberta.



Source: AEFMB, 1988

Table II.2: Number of Quota Egg Producers and the Percentage of Producers that are Hutterite Colonies, by Region, in Alberta. 1976-1987

Years	No., %*						
Regions:	One	Two	Three	Four	Five	Six	Total
1976	54** (74)	80 (26)	26 (42)	75 (10)	82 (7)	17 (11)	334 (26)
1977	56 (75)	73 (28)	27 (37)	69 (10)	65 (9)	17 (11)	307 (28)
1978	57 (75)	71 (29)	25 (40)	68 (13)	61 (9)	15 (13)	297 (30)
1979	57 (82)	69 (33)	20 (55)	56 (16)	52 (9)	12 (25)	266 (36)
1980	56 (82)	68 (33)	20 (55)	56 (16)	53 (11)	12 (25)	265 (36)
1981	56 (76)	68 (33)	20 (55)	57 (15)	52 (11)	12 (25)	265 (35)
1982	57 (82)	70 (35)	21 (57)	51 (17)	48 (10)	12 (25)	259 (38)
1983	56 (80)	66 (34)	21 (57)	50 (18)	48 (10)	12 (25)	253 (38)
1984	56 (81)	67 (38)	21 (52)	50 (20)	48 (10)	12 (25)	253 (39)
1985	56 (82)	67 (40)	21 (57)	44 (22)	48 (10)	12 (25)	248 (41)
1986	57 (84)	64 (42)	20 (60)	41 (24)	45 (11)	13 (25)	240 (43)
1987	57 (78)	63 (42)	20 (60)	36 (27)	42 (25)	12 (25)	230 (43)

* Percentage of quota producers in that region which are Hutterite colonies.
** Quota egg producers per region.

Source: AEFMB, Unpublished Data, 1987.

Buyer Concentration

The largest purchasers of shell eggs from producers has been grading stations. The pricing regulations in Alberta appear to have been the main reason why grading stations became the major purchaser of producer eggs.[6] The number of grading stations in Alberta has declined from 59 in 1975 to 18 in 1986. [7] However, this decline may reflect a change in the definition of a grading station used by Agiculture Canada during this period. Of the 18 grading stations present in 1986, 6 stations handled approximately 90 percent of Alberta's shell egg production.[8] Of these 6 stations, 4 are the result of integration, 3 by producers and 1 by a retail food chain. Four of the grading stations are located in Calgary and 2 in Edmonton, reflecting the distribution of egg production in Alberta. The remaining 12 grading stations, the result of producer integration, generally have handled no more than the parent farms product

[6]These regulations will be discussed in further detail in the section on conduct.
[7]Agriculture Canada. *Poultry Market Review*, 1975-1986.
[8]AEFMB, Personal Communication, 1988.

and any eggs produced by exempt producers in the immediate area.

Barriers to Entry an Exit

Supply management has presented a considerable barrier to entry in the Alberta shell egg production sector. The supply management system has legal authority under the Agricultural Products Board Act (1970) and the Farm Products Marketing Act (1972). The Alberta Agricultural Products Marketing Council was formed under the Marketing of Agricultural Products Act (1970) to oversee the Alberta Egg and Fowl Marketing Board (AEFMB). The National Farm Products Marketing Council was created by the Farm Products Marketing Act (1972) and was given the power to grant permission to groups willing to organize on a national basis, as the Canadian egg producers did in 1972, forming the Canadian Egg Marketing Agency (CEMA).

The CEMA has determined egg production on a national scale, and has allocated a percentage of the national production to each province based on historical production patterns. The initial production quota allowed to Alberta was determined on the level of production attained in the best 12 consecutive months in the period between September 17, 1965 and September 16, 1968 and has been expressed in dozens per year.

In order to maintain their production quota, producers have had to report yearly sales of eggs equal to 21 dozen multiplied by the number of layers specified in the allocated quota.[9] If the allocated level was not maintained the quota was reduced the next year and reallocated by the AEFMB the following year.

Anyone wishing to enter shell egg production in Alberta had to apply to the AEFMB for production quota. There were approximately 150 to 200 applicants on the waiting list for quota in 1986 (Barichello and Cunningham-Dunlop 1987). Quota has not available very often and new applicants were told that there was a 100 to 150 year waiting period. If a new applicant was allocated quota, it was based on the amount originally applied for, to a maximum of 10,000 layers. The maximum amount of quota a producer may hold was 1.5

[9]This rate was 19 dozen per layer per year until 1986. It is determined by CEMA through a periodic producer survey.

percent of the total provincial quota, about 23,000 layers.[10] In the event that total provincial quota was increased by the CEMA, the AEFMB allocated 80 percent to existing producers who have applied for extra quota and the remaining 20 percent to new applicants. This occurred last in 1979 and since 1980 there have been quota cutbacks so that Alberta was at less than its original quota in 1988 (CEMA 1988).

The only other way for an entrant or an existing producer to obtain quota was through the purchase of an existing operation with quota attached to it. In this instance the AEFMB would reissue the entire quota to the new owner. As the quota was the property of the AEFMB, all details of the sale must have met the approval of the AEFMB before the quota is issued to the new owner. The new producer must have operated the farm at the original locattion for three years before the quota may have been moved to another location in Alberta.

By forcing new producers to enter into shell egg production through this mechanism, the transfer rule created another barrier to entry in the form of increased capital costs. For a new entrant to begin production, that portion of land to which was quota attached had to be acquired. This was an extra cost if the purchaser already had suitable land or production facilities at another location, thus the cost of maintaining that facility for three years before the quota was allowed to be moved added to the cost of production. It may also have slowed the progress of efficiency in production by keeping inefficient production units in the industry.

Growth

The demand for and markets of Alberta shell and processed eggs have been changing over time. Alberta has not exported eggs internationally since 1977, however it has been active in the Canadian inter-provincial trade (Table II.3). The amount of Alberta's inter-provincial exports has increased, as indicated by the positive trend (Table II.3). However, Alberta's interprovincial imports have also been increasing. This may be reflective of an increasing

[10]This excepts those units which were greater than this level when supply management was instituted.

Table II.3: Alberta's Trade in Eggs, 1977-1896

Years	Breaker Surplus*	INTERPROVINCIAL imports	INTERPROVINCIAL exports	INTERNATIONAL imports	INTERNATIONAL exports	Trade deficit**
1977	1,249,620	6,594,540	1,602,885	24,000	19,335	4,996,320
1978	1,576,725	5,975,100	1,234,050	23,850	0	4,794,900
1979	1,791,525	6,961,725	876,780	86,400	0	6,171,345
1980	2,574,435	8,911,995	938,520	0	0	7,973,475
1981	2,636,895	9,286,320	912,435	0	0	8,373,885
1982	2,128,695	10,626,510	1,556,070	0	0	9,070,440
1983	2,346,500	10,116,495	1,159,290	0	0	8,957,205
1984	2,940,105	11,022,330	2,215,200	46,350	0	8,853,480
1985	4,222,320	12,396,945	3,512,430	99,960	0	8,984,475
1986	3,765,975	11,910,075	3,018,615	151,290	0	9,042,750
1987	4,547,355	11,469,795	2,410,530	0	0	9,059,265
Trend***	299,810	631,570	198,940	5,537	-878	437,170

* All values expressed in dozens.

** Interprovincial imports + International imports - Interprovcial exports - International exports.

*** The slopes of the trend coefficients are presented in Appendix A.

Sources: Agriculture Canada. *Poultry Market Review*, Annual, 1977-1987.

Table II.4: Consumption of Eggs in Alberta. 1977-1986

Years	Sold for Consumption	Producer Consumption	Total Trade Deficit	Alberta Population	Alberta Per Capita Consumption **	Canadian Per Capita Consumption
1977	34,336,000#	3,273,000#	4,996,320 #	1,912,700	22.27#	18.6#
1978	35,425,000	3,129,000	4,794,900	1,983,000	21.86	18.2
1979	37,461,000	2,946,000	6,171,345	2,052,000	22.69	18.9
1980	39,891,000	2,754,000	7,973,475	2,140,000	23.65	18.9
1981	39,500,000	2,799,000	8,373,885	2,237,000	22.62	18.6
1982	38,266,000	2,263,000	9,070,440	2,318,000	21.39	18.6
1983	39,009,000	2,212,000	8,957,205	2,346,000	21.38	18.2
1984	37,047,000	2,116,000	8,853,480	2,350,000	20.43	17.4
1985	36,616,000	2,074,000	8,984,475	2,358,000	20.22	17.1
1986 ***	38,086,000	2,119,000	9,042,750	2,383,000	20.66	17.3
Trend	219,010	-145,960	501,840	54,828	-0.275	-0.19

In dozens.
* From Table II.3
** Eggs sold for consumption + Producer consumption + Trade deficit / Alberta population.
*** The slopes of the trend coefficient is presented in Appendix A.

Sources:
Statistics Canada. *Production of Poultry and Eggs*, No. 23-202, Annual.
Statistics Canada. *Quarterly Estimates of the Population for Canada, the Provinces, and the Territories*, No. 91-001, Quarterly.
Agriculture Canada. *Poultry Market Review*, Annual, 1977-1987.

population and a relatively constant level of production between 1977 and 1986.

Those surplus eggs not sold on the export markets were sold into the further processing or breaker market. This market in Alberta has been accepting larger amounts since 1977 (Table II.3). The data in Table II.4 show that the domestic demand for table eggs in Alberta, expressed as per capita disappearance, have decreased over the period from 1977-1986. This fall in Alberta's per capita disappearance is in line with that of the Canadian per capita consumption level, which has also decreased, although not at the same rate as Alberta's. The trend of per capita consumption in Alberta, as indicated in Table II.4, decreased at a greater rate than that of the Canadian per capita consumption level.

Product Differentiation

Product differentiation of shell eggs at the farmgate level exists in the form of quality standards established by Agriculture Canada (Table II.5). Due to this, at the farmgate level all eggs within each grade are homogeneous, so that there has been no product differentiation between the output of varying producers. This is line with Bain's (1959) theory that those industries producing perfectly substitutable output will exhibit no product differentiation. Some product differentiation has occured in the health food specialty market where price premiums have been paid for brown shelled or fertilized eggs. However, this market has been a small portion of Alberta's egg production and is generally supplied by exempt producers.[11]

B. Conduct in the Alberta Egg Market

Pricing

Price Elasticity

The price elasticity of demand is an indicator as to how responsive price and quantity are to changes in each other. Thus, when making decisions regarding price, the

[11]AEFMB, Personnal Communication 1988.

Table II.5: Grades and Standards for Canadian Eggs

	Canada A1	Canada A	Canada B[1]	Canada C[1]
Shell	1. clean	1. may have up to three stain spots if each spot does not exceed an area equivalent to 3.2 mm by 1.6 mm and is otherwise clean	1. may show spots of dirt if aggregate area of dirt does not exceed 0.4 cm^2 and stain sports if aggregate area of the stains does not exceed 3.2 cm^2	1. free of dirt
	2. normal in shape and free from rough areas or ridges	2. nearly normal in shpae but may have rough areas and ridges other than heavy ridges	2. may be slightly abnormal in shape and may have rough areas and definite ridges	2. may show stain spots if the aggregare area does not exceed 1/3 of the shell surface
	3. uncracked	3. uncracked	3. uncracked	3. may be cracked but not leaking
Weight/Egg	Extra Large Size - at least 63.8 g Large Size - at least 56.7 g Medium Size - at least 49.6 g but less than 56.7 g Small Size - at least 42.5 g but less than 49.6 g	Extra Large Size - at least 63.8 g Large Size - at least 56.7 g Medium Size - at least 49.6 g but less than 56 7. g Small Size - at least 42.5 g but less than 49.6 g Peewee Size - less than 42.5 g	At least 49.6 g	

Table II.5 Continued ...

	Canada A1	Canada A	Canada B[1]	Canada C[2]
Interior (shown on candling)	1. a firm albumen	1. a reasonably firm albumen	1. may show a distinct outline	1. may show a prominent yolk outline
	2. a yolk shadow that is slightly distinct	2. an indistinct yolk outline	2. may show a yolk that is moderately oblong in shape and floats freely within the egg when twirled	2. may show a yolk that is definitely oblong in shape but does not adhere to the shell membrane
	3. a round yolk that is reasonably well centered	3. a round yolk that is reasonably well centered	3. free of internal defects such as grass yolks, meat spots, blood spots, or congealed albumen, but may have a very slight degree of term development	3. no meat or blood spots with diameter of more than 3.2 mm and no dark grass yolks
	4. free of internal defects such as mottled or grass yolks, visible germ spots, meat spots, blood spots, or congealed albumen	4. free of internal defects such as mottled or grass yolks, germ development, meat spots, blood spots, or congealed albumen	4. an air cell is not more than 9.5 mm deep	
	5. an air cell that is not more than 3.2 mm deep	5. an air cell that is not floating and is not more than 4.8 mm deep		

[1] Does not meet requirements for grades Canada A2 and Canada A.
[2] Not a consumer grade. These eggs are used to make egg products.

price elasticity of demand should be considered.

The price elasticity of demand at farmgate for grade A Large eggs in Alberta was estimated to -0.29.[12] Thus for a 1 percent increase in the price of grade A Large eggs, the quantity demanded at farmgate will decrease by 0.29 percent.

Alston (1986) estimated the elasticity of retail demand in the regulated Victoria egg market to be -0.2, while Hernandez-Estrada (1978) estimated the elasticity of demand for the U.S. wholesale market to be -0.54. Loyns and Lu (1972) estimated the Canadian farm level price elasticity to be -0.83 prior to regulation. All indicate an inelastic demand function for eggs. The differences in the magnitudes could be attributed to varying estimation methods, the difference in time period, and the nature of the variables used.

Farmgate (Producer Price)

The price of grade A Large eggs in Alberta has been based on a national average cost of production survey. This survey has been conducted every 2-3 years, estimating the weighted national average cost of production for grade A Large eggs. The price formula has had two main cost components, those costs which are based on provincial averages and those costs which are based on national averages. The provincially based costs have included pullet costs, feed costs, and labour costs. The national costs have included depreciation, plant and administration overhead, interest costs, a domestic levy for processing, an administration levy, and a grade A Large conversion factor. The formula by which each cost was calculated was derived by the national survey. The Canadian average of the provincial costs was added to the sum of the national costs, resulting in the total national average cost for grade A Large eggs. The freight and handling from Toronto to Manitoba was then deducted to achieve a Manitoba base price. To this base price the freight and handling from Manitoba to Alberta was added, resulting in an Alberta farmgate grade A Large price, at which grading stations in Alberta had to purchase grade A Large eggs.

[12]Appendix B

The price of grades other than grade A Large was based on the price spread from the grade A Large price. Grade A Extra Large eggs were priced the same as grade A Large because some of the grading stations in the province could not distinguish between the two grades.

The spread between grade A Large and grade A Medium was usually about 8 cents/dozen, depending on the supply situation. This spread was established by CEMA, and was based on the historical price spread between the two grades.

The price for grade A Small eggs was set in the same manner as grade A Medium, with the spread being usually 50 cents/dozen and any variation would be caused by the supply of grade A small eggs.

The prices for grade A Peewee, B and C grades have been set by the AEFMB. The price for these grades has been frozen at a level at which these grades have historically been sold. There has not been much demand for these grades, the main market being the further processors. Any loses incurred by selling these grades was recovered through the grade A Large conversion factor included in the price formula.

Further Processor Price

The eggs sold to further processors or breakers, have been priced so as to be able to compete in a North American market. The reasons for this were threefold:

1. The import quotas which Canada imposed on processed egg product have been such that there was virtually free movement of such product between Canada and the United States (Katz 1988),
2. The large domestic users of processed eggs could easily have moved production to the U.S., and
3. The users of processed eggs could have adjusted their input mix to exclude processed eggs.

Therefore, eggs which were declared as surplus by the grading stations were sold to the CEMA at the price which the grading station paid for the eggs, plus a 7 cent/dozen handling fee. The CEMA then sold these eggs to the breakers at a price which allowed the

breakers to compete against U.S. processors. In Alberta, the price was based on a Mid-West U.S.A. breaker price quote, with transportation, handling, tariffs, and an orderly handling charge included.[13]

Import and Export Prices

Eggs exported by the CEMA were priced at competitive market prices. Foreign buyers, usually U.S. breakers who wished to purchase eggs, submited a tender to purchase surplus eggs to the CEMA. The highest bid price, generally was lower than the CEMA processor price, was awarded the contract.

The importation of eggs was done under license granted by the Canadian government to be used in periods of excess demand. The global import licenses were granted to companies historically importing graded eggs. An importer was allowed to import ungraded eggs directly. In addition to the global license, the importing companies were allowed to apply for supplemental import licenses.

The global import license was divided into monthly allotments. Once the global allocation for that month had been used and the demand for a certain classification of eggs still existed, the importer could apply to the Special Trade Relations Office (STRO) for a supplemental import license. The application indicated the desired quantity and quality of eggs or egg product desired. Once this was done, the STRO contacted CEMA and CEMA then had 2 days to find the desired product in Canada, deliverable in 5 days. If such product was not available, the supplemental license was then granted.

While the procedure for importing eggs was specifically laid out, import companies had been suspected of abusing the regulations.[14] Once an import company had used up all of the global license, he applied for a supplemental import permit for product which was not present in Canada at that time, whether a demand existed for that particular product or not. The importer then sold these eggs at either the higher Canadian price or declared them as surplus and sold them to CEMA as surplus Canadian

[13]The tarriff on these eggs in 3.5 cents/dozen and the orderly marketing charge is 3 cents/dozen (AEFMB 1987).
[14]AEFMB, Personnal Communication, 1988.

product.[15]

Vertical Integration

The administered farmgate price and the regulations limiting producer size has limited the degree of vertical integration. Only 14 producers had integrated forward into grading and only one food retailer had integrated into grading in 1986.[16] As the price for eggs was the same for all producers, the risk of unequal treatment did not exist. The policies limiting production size also limited the amount of vertical integration by farmers as there were few farms in Alberta capable of producing enough eggs to make an egg grading operation feasible.

Entry Policies

The barriers to entry encountered in the Alberta table egg industry have not been the result of any individual firm behavior but were the result of a concerted effort by the producers of Alberta. As such the industry in Alberta and the rest of Canada developed into an oligopolistic type of organization which set prices and production to help producers recover their costs of production and to ensure fair prices to consumers.

The processing sector of the egg industry existed in an nonregulated market environment. However, the prices and the availablity of inputs (eggs) have been affected by the regulated system.

C. Performance of the Alberta Egg Market

The efficiency of resource allocation in an industry is affected by how freely the resources are allowed to reallocate. The barriers to entry and exit in the Alberta egg industry have restrained the movement of resources. This has hampered the level of production and marketing efficiency which was attained in the market. By not allowing the free transfer of productive resources and the achievement of scale economies, the least cost level of

[15]See Appendix C for a further discussion of this topic.
[16]AEFMB Personnal Communication 1987.

production was not achieved.

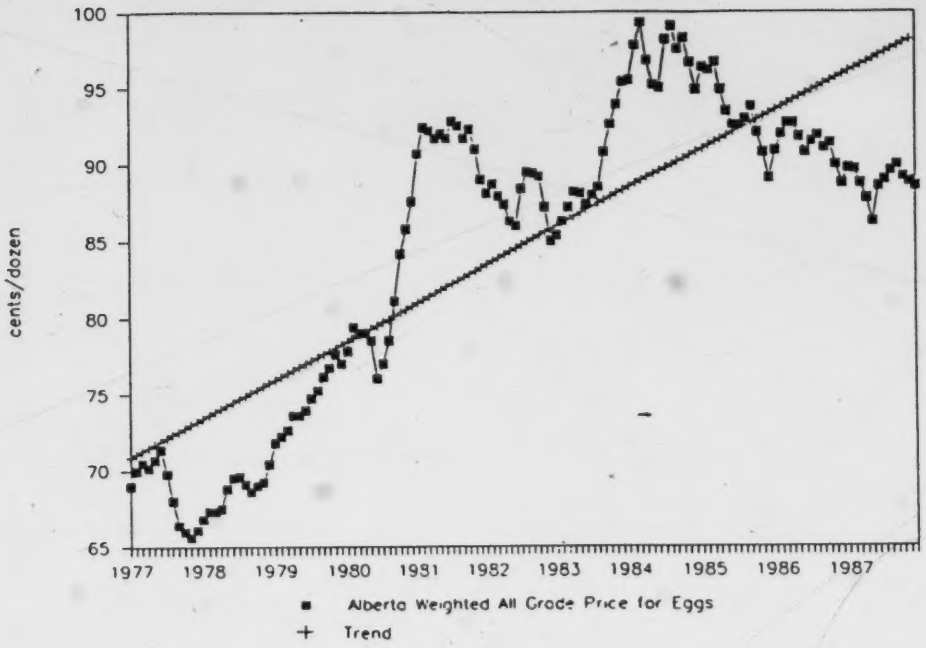
The need for a producer to have as much information as possible about alternative exchange possibilities and the costs associated with gathering this information has been reduced by the supply management system. In this system, all producers of eggs received the same price for equal product, independent of the location and time of production. Thus eliminating the risk involved with locating buyers and producing a product with the appropriate characteristics.

At the time supply management was instituted, one of the concerns raised by producers was the instability of prices. The central pricing scheme used by the CEMA since 1976 has caused the fluctuations of price to decrease. Figure II.3 presents the weighted all grade price of eggs in Alberta from 1977 to 1986. It can be seen that the price variability between months was less than between years.

The processing sector in Alberta, while not directly involved in the supply management system was affected by it. Although the price of the input was fixed, it was fixed uniformly for all participants. Thus processors were forced to compete in other aspects of the input market. This has raised concern of some graders offering price premiums.

The processors were also affected by the production limits imposed by supply management. While the limited supply can limit the amount of market development a processor may do, it also depressed the uncertainty of product availability. A processor knew that production would fluctuate little and could count on a minimum level of input.

Figure II.3: Weighted All Grade Price for Eggs, Alberta. 1977-1986



Source: Agriculture Canada. *Poultry Market Reveiw*, 1977-1986

D. The Structure of the U.S. Egg Industry

Seller Concentration

The level of producer concentration in the United States egg sector has increased to the point where in 1986, 22 percent of the laying hens were controlled by 10 firms and 53 percent of the national U.S. laying flock was held by firms with a capacity, either single unit or combined, of 1 million hens or more (Anonymous 1986). Concern has been rasied about the degree of concentration within the top 10 firms. The difference between the top national firm and the fifth largest national firm was 7.2 million layers in 1985 and had narrowed to 4.2 million in 1986.

Although the size of production units has been increasing, the national market power held by each firm has not increased proportionally. Generally cartoned eggs do not move more than 200 miles from the farmgate. However, short term imbalances in the price between regions has resulted in long distance movement of nest run eggs (Schrader *et al.* 1978). Therefore large operations may have been able to compete on a national basis.

The regional distribution of production in the U.S. has been shifting over time. Figure II.4 indicates that between 1975 and 1987 the East North Central and the North Atlantic regions showed increasing amounts of birds. The West North Central, South Atlantic and Western regions all had decreases in the number of laying birds in those regions during the same period.

Prior to 1975 a large shift occurred as production moved from the Mid-Western region to the Southern regions. In 1960, the Mid-West produced 42.2 percent of the eggs in the U.S., while in South held 27.5 percent. In 1971 the roles were reversed as the South produced 41 percent of the U.S. eggs while the Mid-West was left with only 28 percent (Hernandez-Estrada 1978). This shift could be attributed to increased feed supplies in the South, improved transportation methods and lower building, land and labor costs.

The West North Central region has always been one of the major surplus areas in the United States and the Pacific region has become increasingly surplus (Hernandez-Estrada 1978). Thus, even though the Western region has been experiencing a decrease in flock numbers, egg production has been surplus.

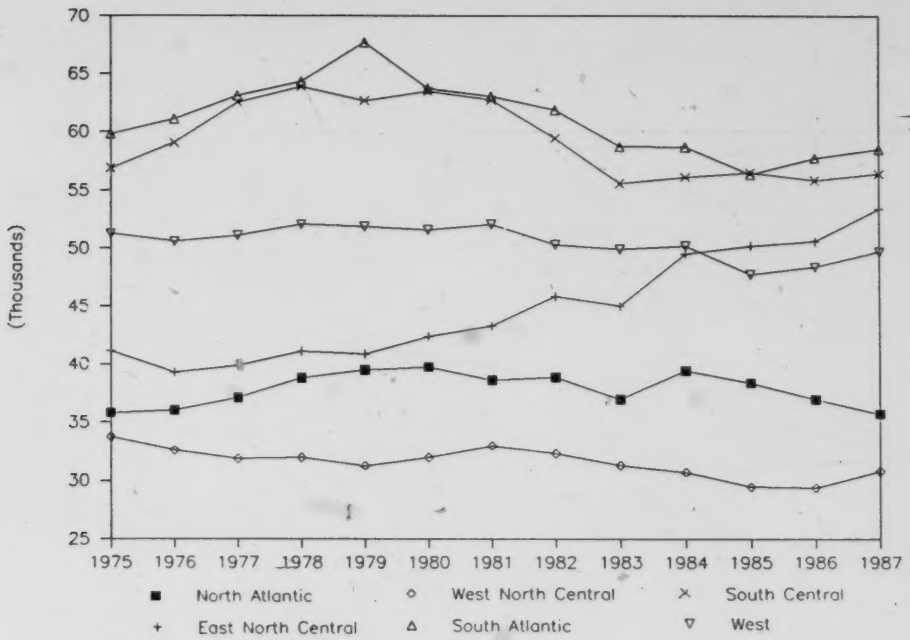
Buyer Concentration

There have been two major paths eggs may take after leaving the farmgate in the U.S., the assembly-packer[17] and the further processors.

The assembly-packers in the U.S. have exhibited increasing concentration levels, decreasing in number while increasing in size (Schrader *et al.* 1978). In the late 1950's there were approximately 15,000 egg handlers, by 1976 the number had decreased to 4,394. Of these

[17]Known as grading stations in Canada.

Figure II.4: Regional Distribution of the U.S.A. Laying Flock. 1975-1987



Source: USDA. *Livestock and Poultry Situation and Outlook,* 1988.

only 300 plants handled more than 3,000 cases[11] per week, 1,400 handled 400-3,000 cases per week. The rest, about 2,700 plants, handled about 120 cases per week, which was equivalent to the weekly output of 9-10,000 laying hens (Schrader *et al.* 1978).

The assembly-packers often carried out the functions of grading and wholesale distribution. While nearly all eggs were sold using USDA grading standards, few were graded under USDA supervision. The packer-wholesaler operations became integrated with the production units, particularly with the larger production units who could produce enough to fully utilize an assembly-packer operation.

[11]A case contains 30 dozen eggs.

Unlike the assembly-packers, the breakers in the United States have not as vertically integrated. They have however, experienced the same rationalization as production and assembly-packing. In the 1970's, approximately 80 percent of the U.S. egg product was produced in 100 plants (Schrader *et al.* 1978). Of these firms, 20 accounted for 43 plants and 58.3 percent of the total eggs used for breaking. Of all the firms involved in producing dried egg product, the 20 largest accounted for nearly 100 percent of production. Since 1971, the number of breaking plants has decreased to 96 in 1986 from the 1971 total of 139. [19] The level of concentration has also increased so that in 1987 the percent of the breaking sector output controlled by the top 4 firms (CR4) was 39 percent, CR10, 60 percent, and the CR12 was 66 percent.[20] This increase in concentration occurred along with an increase in output. Since 1983 the growth rate of eggs broken has been 6 percent per year, with an increase to almost 11 percent in 1986.[21]

Barriers to Entry and Exit

The production and marketing of eggs in the United States has been carried out in an unregulated environment. As such, there have been no government barriers to entry or exit. Any barriers which may exist would have been in the form of the ability to acquire the technology and initial investment required. The level of fixed investment per unit cost has increased, thus making start up costs higher (Schrader *et al.* 1978).

Of the three stages examined, the production sector has had the least barriers to entry. Schrader *et al.* (1978) estimated that the investment needs and labor requirements were still within the reach of a sole proprietor, as marketing and production contracts may be acquired in those regions which already support egg production. Entry into assembly-packing and wholesale distribution has become harder due to the long standing relationships between retailers and existing assembly-packers.

---

[19]USDA. *Livestock and Poultry Situation and Outlook*. May 1988
[20]Ibid pg. 55-57.
[21]Ibid pg. 50.

Entry into the breaking sector of the U.S. egg industry appears to have become the hardest. The high concentration levels indicate that large economies of scale could be obtained and that the degree of market power present may have become too much for a newcomer to overcome.

Growth

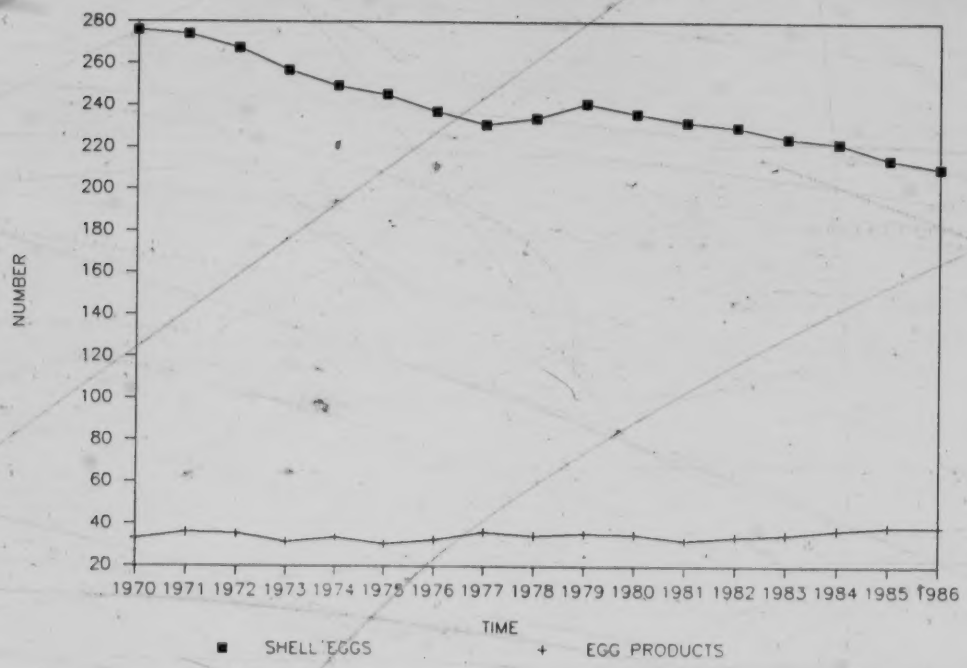
Over time increases in population and exports (Table II.6) have helped offset the decline of per capita table egg demand (Figure II.5). The per capita consumption of processed eggs over time has also helped offset the downward trend of per capita egg demand (Figure II.5). The increasing trends in these factors has allowed the production of eggs in the United States to trend upwards over time (Table II.6).

Product Differentiation

Product differentiation of shell or processed eggs has occured mainly in the form of brand naming. For shell eggs, it has occured most frequently at the retail level. The egg carton would be carrying either the retailers or suppliers label. Brand naming has not been important for bulk or loose packed cases of eggs. The importance of retail brand naming has been increasing so that there is about a 50/50 split between retailer and supplier labels. The amount of brand naming has risen in the same fashion as the increase of integration and marketing organizations.

Quality differentiation has existed in the form of USDA grade standards. A uniform, nation wide grading system has not existed in the U.S., however, most eggs have been sold according to USDA standards or state equivalents (Schrader *et al.* 1978). There are wholesale grades, both official and unofficial, which are used in the wholesale trade. Scrader *et a.l* (1978) estimated that less than 30 percent of the eggs reaching consumers had been graded under USDA supervision.

Figure II.5: U.S.A. Per Capita Consumption of Eggs and Egg Product. 1970-1986



Source: USDA. *Livestock and Poultry Situation and Outlook*, May 1988

Table II.6: U.S.A. Table Egg Production, Consumption, and Trade Surplus. 1976-1986

Years	Production *	Trade Surplus *	Population **	Total Egg Consumption *
1976	5376.8	28.3	218.035	4312.2
1977	5407.5	34.0	220.239	4240.9
1978	5608.3	35.4	222.585	4399.7
1979	5777.1	32.6	225.055	4522.5
1980	5806.3	74.0	227.757	4483.0
1981	5824.7	115.6	230.138	4450.6
1982	5801.9	84.2	232.52	4454.8
1983	5659.3	6.9	234.799	4395.9
1984	5708.2	32.7	237.001	4387.7
1985	5688.0	18.5	239.283	4280.1
1986	5704.9	14.9	241.596	4239.0
Trend ***	25.65	-1.62	2.3	-4.78

* Millions of dozens.
** Millions.
*** The slope of the trend coefficients are presented in Appendix A.

Source: USDA. *Livestock and Poultry Situation and Outlook,* May 1988.

E. Conduct in the U.S. Egg Market

Pricing

The price elasticity of demand for shell eggs in the United States has been inelastic in nature. Hernandez-Estrada (1978) estimated the average price elasticity of demand for grade eggs to be -0.5 at household, -1.4 for combined household and breakers markets, and -16.2 for the breaker market demand, while Schrader *et al.* (1978) estimated the elasticity at farmgate to be -0.23.

The egg sector in the United States has operated in the absence of government regulation. Market behavior has thus been determined by the private firm. Although the market power of some of the firms may have increased, aggressive rivalry has been the norm (Schrader *et al.* 1978). However, due to high levels of integration, the majority of the pricing

decisions have been done through pricing formulas or private negotiation, based on market quotations. In the Eastern U.S., two thirds of the prices have been based on the Urner Barry, New York price quotes, while the Western price formulas tended to be based on the USDA's Market News Quotes (Slane 1981). As a result of this pricing activity, fewer actual open market prices have been reported, raising concerns as to the validity of the reported market prices (Marion 1986). Chavas (1978), using spectral analysis, showed that retail and farmgate prices have been led by wholesale prices. This suggests that wholesale operations have been tending to be price makers and that the producer and retail prices follow after a lag period.

Schrader *et al.* (1978) indicate that a Special Census of Poultry conducted in 1976, presented 3 types of pricing under contract: a minimum amount per dozen, a specified amount per bird, and payment based on feed conversion. Two less common methods of pricing were returns tied to market price and profit sharing by a negotiated formula. It was also shown that the use of contracting methods varied by region.

Integration

Vertical integration has been shown to exsist in the United States egg industry from hatching forward to retail, in both ownership and contract arrangements. Schrader *et al.* (1978) estimated the amount of national egg production from large integrated producer-packers to be 37 percent. Contract integration, mainly by feed and hatchery companies, accounted for 43 percent of production. The remaining 20 percent of the U.S. production came from independent producers. However, even these independent producers would have had some sort of formal or informal marketing arrangements with egg packers (Marion 1986). Regional disparities as to the type of integration have been shown to exist. Jones (1980) estimated that 75 percent of egg production in the Southern regions was done under contract, whereas ownership integration was popular in the West. The breeding and further processing stages are not vertically integrated. The long periods involved in research has left the breeding sector to become dominated by specialty firms (Marion 1986). Further processors, while not being vertically integrated, have become horizontally integrated with

food processors.[22] The reasons for vertical relationships include the achievment of economies of size, reduction of transaction costs, and guaranteed supply or markets. The reasons for contracting production have included increased capital availability, risk transfer, outlet for feed or birds, access to a share of profits by the contractor, and guaranteed egg supply.

Marketing Orders

While the U.S. federal government has not become directly involved in the egg industry, the majority of states have allowed marketing orders for eggs. These orders have operated mainly to raise funds for egg promotion (Schrader *et al.* 1978). There have been a number of marketing co-operatives which have participated on a regional or local basis, performing mainly assembly-packing-distribution functions for their members. There have also been co-operatives who act as wholesale-distributors for eggs packed by large integrated operators who do not perform these functions.

Supply management has been present in the United States egg industry but only in a small, and short lived way. California experimented with supply management for a short period of time in an effort to raise prices at the bottom of the price cycle. The idea was for producers to withhold product from the market in an effort to raise prices. All the system really achieved was to interfere with the market clearing process and to distort the price signals so that production adjustments were delayed. Consumer pressure caused the experiment to be stopped (Schrader *et al.* 1978). Even with this experience in supply management, some egg producers in the U.S. were still interested. Interest was high enough to have a producer referendum called, in vain, to vote on the acceptability of supply management.

[22]USDA, *Livestock and Poultry Situation and Outlook.* May 1988.

F. Performance of the U.S. Egg Market

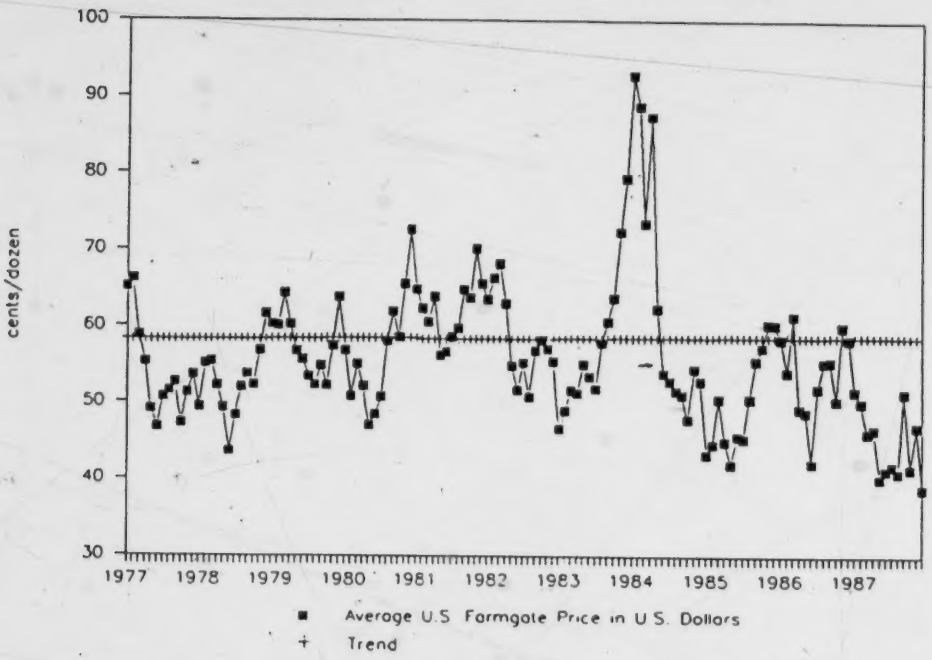
The United States egg industry has experienced substantial growth since the 1950's. It has developed into an industrialized, capital intensive industry, evolved from a loosely coordinated, atomistic industry. The adoption of new technologies and marketing techniques has made economies of scale possible and egg production has now become available to areas of the U.S. which have not previously supported egg production. The new technology brought lower costs and more efficient production causing those producers who were inefficient to be forced out of the industry. This lower cost of production is reflected in the level of farmgate prices. Figure II.6 presents the U.S. farmgate price, which has been trending downwards, reflecting the declining cost of production.

Although competition in the U.S. egg industry has resulted in an efficient production sector, price variability still existed. As shown in Figure II.6, the U.S. farmgate price has not been constant between years or months. The variability in price may have been caused by factors which affect supply. Disease, causing high mortallity, can lead to increased prices, such as occured in 1983 and 1984, when an outbreak of avian influenza decreased production.

The increase of integration may be attributed to producers attempting to escape the risk of price shifts, the achievement of economies of scale, decreasing transaction costs, increased availability of capital, and secured markets. As a result of the integration, open market prices have become suspect as to their accuracy in reflecting market forces. Thus information concerning the state of supply and demand in the market may have become distorted.

The level of transaction costs has decreased in the U.S. egg industry, accomplished mainly through vertical integration and contract production. However, although the level of transaction costs has decreased, the cost of change may have become very high due to long standing marketing relationships .

Figure II.6: U.S.A. Average Farmgate Price. 1977-1987



Source: USDA. *Agricultural Outlook and Situation*, 1977-1988

III. Analysis of Free Trade in Table Eggs Between Alberta and the United States

This chapter presents an analysis of the impact on the Alberta table egg production and processing sectors following the implementation of free trade with the United States in table eggs. This analysis is based upon several assumptions; the first of which is that all restrictions on the movement of eggs between the United States and Alberta are eliminated, thus placing the Alberta table egg sector in a competitive situation. Secondly, it is assumed that the egg production and processing sectors in Alberta will not face any form of regulation or intervention by either the federal, provincial, or municipal governments.

Based on these assumptions, the objective of this chapter is to analyze two items:

1. To ascertain how table eggs in the Alberta table egg market would be priced in a free trade situation between Alberta and the United States.
2. To hypothesize as to how the structural characteristics of the Alberta table egg sector may change upon the start of free trade in table eggs between Alberta and the United States.

A. Pricing

With stated assumptions in mind, in the event of free trade between Alberta and the U.S. the first characteristic of the market to change would be the pricing mechanism. To ascertain the price level in the Alberta table egg market upon the imposition of free trade, the analysis applies specifically to the table egg sectors in the economies of the United States and Alberta.[23] While trade is assumed to be unrestricted, there are conditions in both markets which may hinder product flow. The result of which may be that product may not flow, however the potential for movement would cause the Alberta market price for table eggs to follow the U.S. market price.

Both the American and Alberta table egg market channels have several stages; the

[23] A disadvantage of examining specific markets is that the influences of substitutes and competitive products are left out of the analysis (Houck 1986). As table eggs do not have a close relationship with any single group of commodities (Schrader *et al.* 1978), this analysis should not be severely restricted by excluding outside influences.

farmgate, wholesale,[24] and retail. Retailers in Alberta would not import table eggs directly from U.S. wholesalers for two reasons. The nature of the Alberta retail market has been such that there are only two firms large enough to purchase tables eggs in the volumes needed to acquire low cost, bulk transportation rates, and one of these firms has integrated into wholesale. The second reason is that in the U.S., few cartoned eggs have been moved more than 200 miles from the producer (Schrader *et al.* 1978). As Alberta table egg producers would not usually import eggs, U.S. table eggs would be imported by Alberta wholesalers. The type of product imported may be loosely packed, graded or ungraded eggs, purchased at farmgate or from egg assembly firms. However, in Alberta the majority of wholesalers have become owned by producers. Also, differences in quality standards may hinder the movement of product between Alberta and the United States. Again, while these differences may hinder the flow of eggs, they may not completely block movement, thus providing the potential of product flow. Due to this, the price that Alberta producers may face would be the U.S. farmgate price plus transportation costs.

Figure III.1 presents the average U.S. farmgate price, in Canadian dollars, along with the average Alberta cost of production (COP). This COP figure is based on the CEMA Cost of Production Survey data (obtained from the AEFMB) and only includes those costs elements representing factors of production such as pullet, feed, labour, plant administration and overhead, and interest costs. This COP is less than the historical producer price by the amount of the administration and surplus removal levies and the A Large conversion factor. The U.S. farmgate price, while in Canadian dollars, does not include the cost of transportation and handling from the United States. Historical data on truck transportation costs from the U.S. to Canada is not available. If these costs were to be included, they would increase the level of the U.S. farmgate price, thus affecting the margin between the two data series. Figure III.1 indicates that between 1977 and 1987, the U.S. farmgate price (less transportation costs) was more variable the the Alberta COP, as indicated by the coefficients

[24]The assembly-packers and grading stations perform this aspect in the U.S. and Alberta respectively.

of variation presented for each series.[25] The difference between the U.S. farmgate price and the Alberta COP, presented in Figure III.2 as the U.S. farmgate price less the Alberta COP, presents the average spread between the two series and reflects the relationship between a possible market price for table eggs in Alberta during that time period and the historical COP of table eggs in Alberta.[26] If the market price for table eggs in Alberta between 1977 and 1987 had been equivalent to the U.S. farmgate price, the market price would have infrequently covered the Alberta producers COP, as shown in Figure III.2. This indicates that Alberta producers may not have had their average cost of production covered by the average U.S. farmgate price during that time period.

B. Structural Characteristics

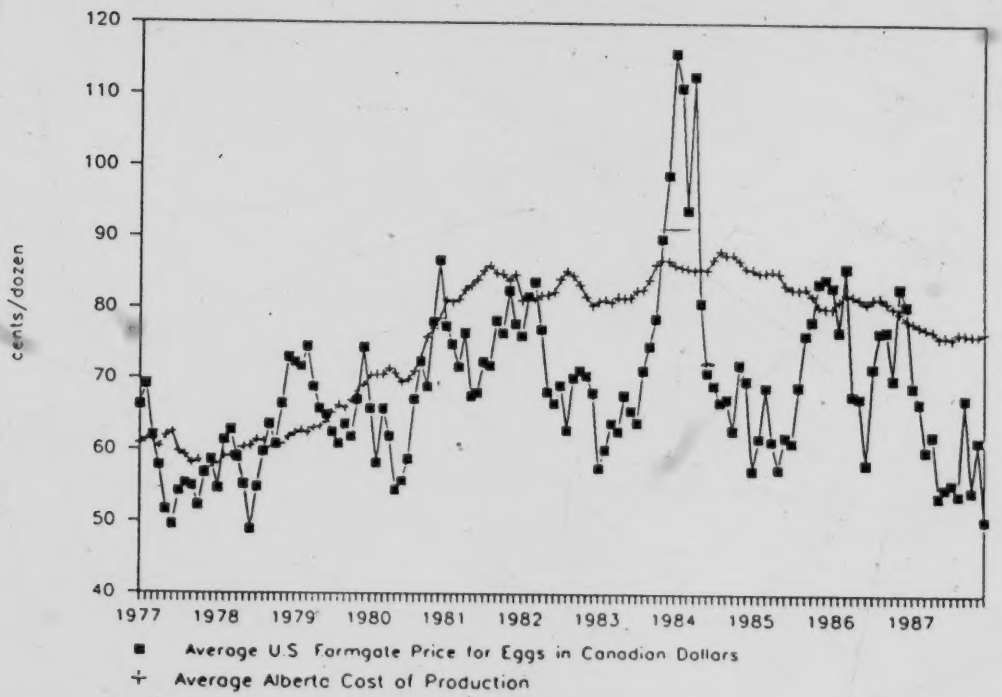
Seller Concentration

Free trade in table eggs between Alberta and the U.S. would give Alberta table egg wholesalers the ability to purchase table eggs from a greater number of producers. This would have the effect of decreasing the level of concentration of sellers at the farmgate. However, the impacts upon the number of producers in Alberta may be negative. The level of the market price may not be high enough to cover some producers cost of production. However, as the Alberta COP figure presented is an average, and less than the historical producer price level, some producers costs would be above this level and may be not able to compete.[27]

A large proportion of table egg production quota is held by producers not specializing in egg production (mixed farmers). In 1987, 92 percent of table egg production quota in Alberta was allocated to farms that did not have only table egg production as the sole source

[25]Variability can be indicated by the coefficient of variation, which expresses the standard deviation as a percent of the mean (Mason 1981).
[26]Not the historical producer price in Alberta.
[27]Precise estimates as to the magnitude of any change are not possible with readily available data. A more accurate method of estimating potential producer migration would be to conduct a cross sectional cost of production survey of Alberta egg producers on a size basis. This would provide an estimate of the size of producer which may be able to producer at a new market price.

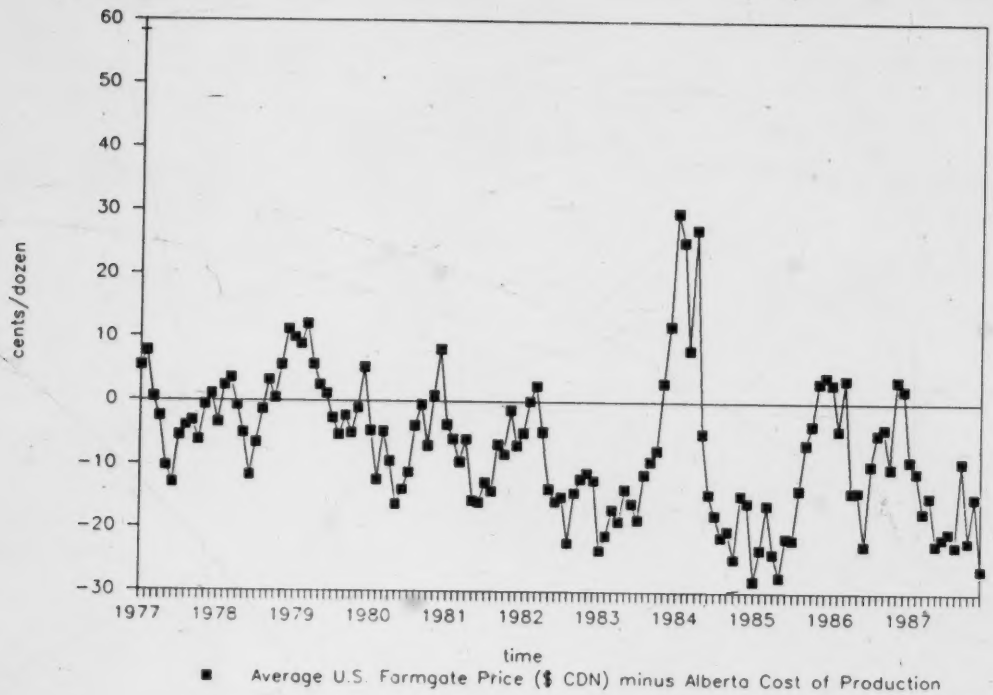
Figure III.1: Average U.S. Farmgate Price* and the Average Alberta Cost of Production, in Canadian Dollars. 1977-1987



* Does not include freight and handling costs.
Coefficient of Variation; U.S. Farmgate Price: 136.92
Coefficient of Variation; Alberta Cost of Production: 91.24

Source: USDA. *Agricultural Outlook and Situation,* 1977-1988 and the AEFMB. Unpublished Data 1988.

Figure III.2: The Difference Between the U.S. Farmgate Egg Price and the Alberta Cost of Production. 1977-1987



of agricultural income.[37] These mixed farms, which include a large portion of Hutterite colonies, may have several advantages that may enable some of them to produce at a lower cost. They generally have family labour available all year long and may not attribute the same opportunity cost to family labour as the CEMA cost of production formula. Mixed farms may also have an advantage in that other aspects of the farming operation may be able to aid the egg operation when the market price is lower than the cost of producing. However, if the producers costs of egg production are not being covered by the market price, it is expected that the producer will discontinue egg production.

[37]AEFMB, Personal Communication, 1988.

As the right to produce eggs in Alberta has become limited, to assume that it did not acquire a value, explicit or implicit, would be incorrect. If this value has been implicitly capitalized into the cost structure of the production unit, the implicit value of quota would be lost without regulated production. The right to produce eggs may also have affected a producers decision to borrow capital. A producer who borrowed money based on the fact that he held production quota, and then lost that quota, may not be able to service his debt load with a lower market price.

While mixed farmers and the Hutterite colonies in Alberta may have an easier adjustment to changes in the market brought on by free trade, those producers who have attained some degree of scale economies may be in the best position to produce at lower prices. It has been estimated that in the U.S., increases in flock size from 10,000 to 72,000 birds resulted in the lowering of costs by 2.82 to 4.83 cents per dozen eggs and that the majority of the economies of scale had been achieved at the 20 to 30,000 bird size (Jones 1980). The economies of scale for a single production unit, integrated with an egg grader, has been limited in size to about 700,000 layers by the capacity of the grader. [29] Jones (1980) also mentioned that the economies of scale being measured did not include those which could be attained through large volume purchases of feed and other inputs, along with the managerial and financial economies which could be reached in large scale units. Schrader *et al.* (1978) indicate that the dimensions of scale economies such as management, marketing, and finance may be more important than the achievement of technical efficiency.

There have been no studies done which indicate the degree of economies of scale achieved in the Alberta table egg sector. The only studies done, as the CEMA cost of production survey and cost of production studies conducted by Alberta Agriculture, attempt to estimate an average provincial cost of production and have not provided any conclusive evidence as whether or not economies of scale have been achieved in Alberta. However, if the U.S. studies on economies of scale are extrapolated to Alberta, some of the farms in Alberta may have achieved some degree of economies of scale. If the U.S. figure of 20,000 layers per

[29]Hurbruck's Poultry Ranch, Saranac, Michigan, Personal Communication, 1987.

farm is used as a guide to determine economies of scale, only 14 Alberta producers had a capacity of greater than 20,000.[30] This represents only 4.34 percent of the provincial quota holding egg producers.

Economies of scale however, may not be difficult for producers in Alberta to achieve. As the majority of producers have invested in new technology, a doubling of production size would require a proportionally smaller outlay of capital than if complete rebuilding were needed.[31] Increasing production capacity may also be accomplished through integration and merger, imitating the evolution of the U.S. egg sector, but may a way of reorganizing production facilities in order to achieve economies of scale. In 1987 there were 58 quota holding producers with capacities greater than 10,000 birds. Thus, in the event free trade were instituted, these producers may be able to achieve economies of scale. If this were to occur, these 58 producers, with a capacity of 942,530 layers, would hold about 1,885,061 layers if they were to double capacity. This level would be larger than the total 1987 provincial quota allocation by 431,084 birds. Of these 58 producers, 19 producers were specialized egg producers and the rest were mixed farms.

Not all of such producers may expand and not all of the mixed farmers with egg production may continue table egg production in the event of a price drop brought on by the implementation of free trade and de-regulation. Those producers whose debt load has increased due to past investments may find additional financing limited, especially if quota had implicitly been given a value and incorporated into the farm asset value. Those producers whose COP is just being met by the current CEMA pricing scheme would not be able to continue if the price of table eggs decreased.

Buyer Concentration

Under free trade, the United States and Alberta table egg wholesalers would have access to each others markets, and depending on the price differential table eggs may flow in

[30]This represents unit capacity, not quota levels as current quota levels are 13.5 percent less than 100 percent capacity (AEFMB, Personal Communication 1988).
[31]AEFMB, Personnal Communication, 1988.

either direction. It has already been established that Alberta wholesalers may not be able export table eggs into the U.S. retail market and visa versa. However, Alberta wholesalers may enter the U.S. in search of lower priced table eggs at the farmgate level.

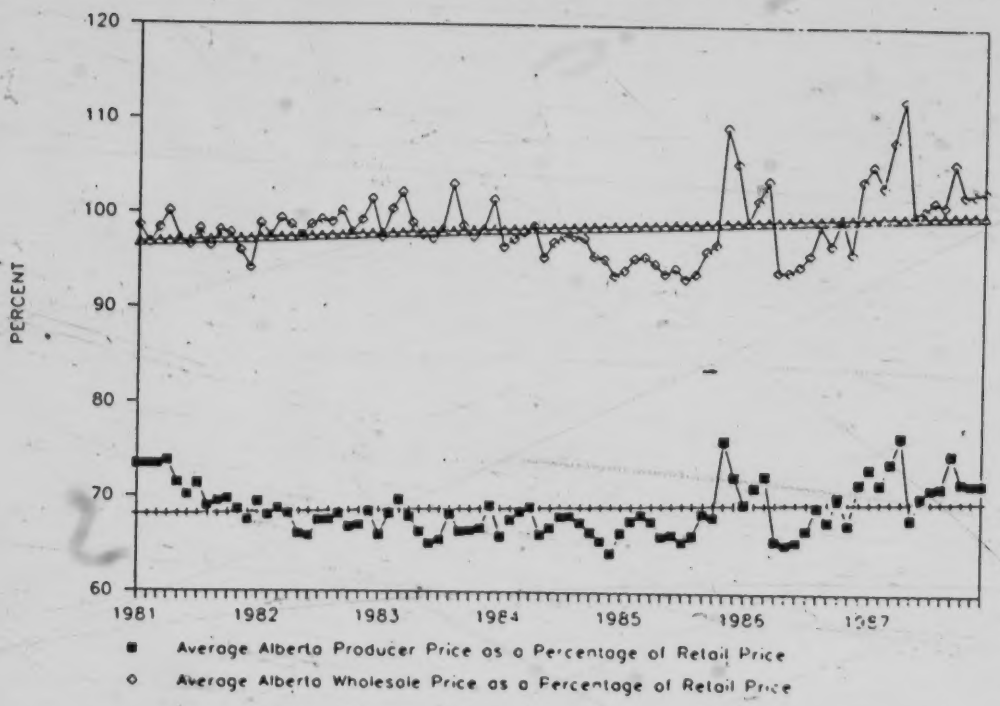
The level of concentration at wholesale has been shown to be quite high, with 5 of 18 firms handling approximately 90 percent of the table eggs produced in Alberta. [32] Integration has been present, as all but two of the 18 grading stations are owned by producers, with one of the other two being owned by an Alberta food retail operation.

Figure III.3 presents the weighted average Alberta wholesale[33] and producer[34] prices as proportions of the weighted average Alberta retail price.[35] Figure III.3 indicates that the producer share of the retail price has been close to the 70 percent range since 1981. It is also shown in Figure III.3 that the wholesalers share of the retail price has been quite high, occasionally exceeding 100 percent. Both of these ratios are greater than the equivalent U.S. proportions presented in Figure III.4. Wholesale prices in Alberta have been such a large proportion of the retail price for several reasons. Firstly, eggs have been priced as loss leaders at retail on a regular basis (about every 2 weeks) or as the competitive actions of rivals dictate. When not priced as such, the gross margins on eggs tend to be only 7 to 8 percent of retail price.[36] Secondly, one of the largest food retail operations in Alberta owns a grading station and thus their price at retail may have been less than other retail egg prices due to decreased transaction costs. Another reason may due to differences in the data, as the producers prices have been monthly provincial averages, as determined by CEMA and the AEFMB, while the wholesale prices were selected from grading stations in the region while the retail prices were representative of certain stores in a specfic urban center, in this case Edmonton, Alberta. As such, these data series may not be reflective of the same market conditions.

---

[32]AEFMB, Personal Communication, 1987.
[33]Weighted by the amount of throughput at each grading station.
[34]Weighted by the amount of receipts.
[35]Weighted by the amount of eggs sold at selected stores in Edmonton, Alberta.
[36]Edmonton CO-OP, Personal Communication, 1988.

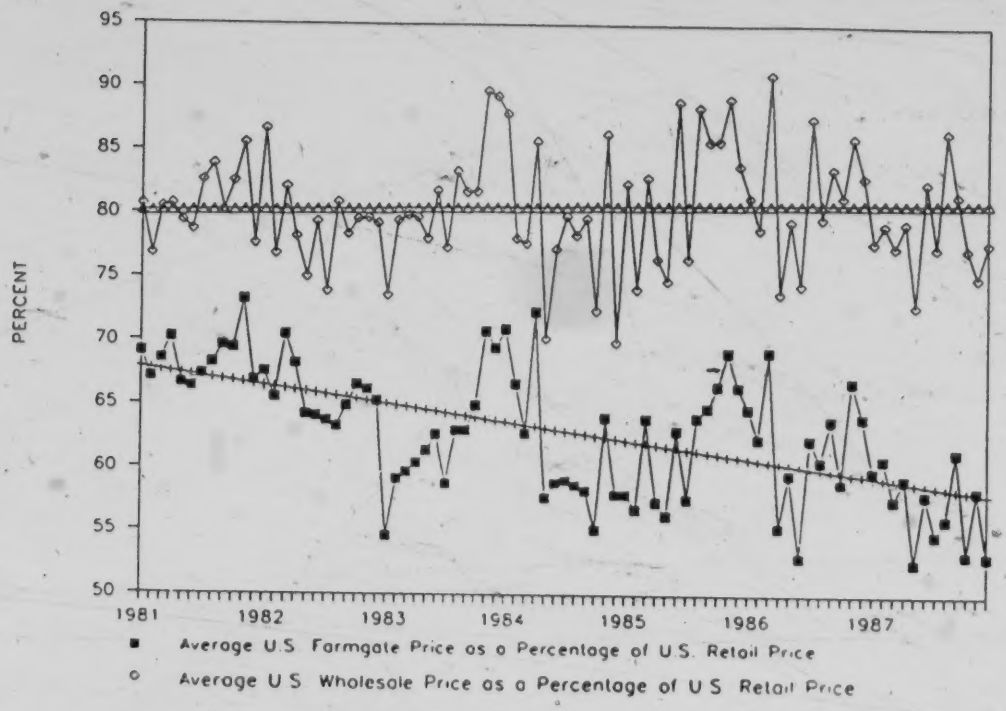
Figure III.3: Average Producer and Wholesale Shares of Retail Table Egg Price, Alberta. 1981-1987



Source: Agriculture Canada. *Poultry Market Review*, 1981-1987.

The percentage of the retail price that U.S. producers and wholesalers receive has not been as high as it is in the Alberta market. Figure III.4 indicates that the percent of retail price received by the wholesalers has been about 80 percent of the retail price, which is less than in Alberta. The producers share of the retail price has been decreasing in the U.S., from about 70 percent in 1981 to about 55 percent in 1987. While the wholesalers in Alberta currently do not participate in the process by which producer prices are arrived at, they are involved in the process that determines the price of their output. Under free trade between Alberta and the U.S., producer prices would no longer be set by CEMA and the AEFMB. Wholesalers would have the potential to purchase table eggs at the lower U.S. farmgate price. However, because of the oligopolistic/oligopsonistic structure which characterizes the Alberta

Figure III.4: Average Producer and Wholesale Shares of Retail Table Egg Price, U.S.A. 1981-1987



Source: USDA. *Agricultural Outlook and Situation*, 1981-1987.

table egg wholesale group, the price level at retail may not decrease proportioanally with a decrease in producer prices.

The further processing sector in the Alberta would be the least affected. As the single further processor in Alberta has been competing in a North American market, and the quantitative restrictions at the border have not hindered trade in processed egg product (Katz 1986). As the input price for further processors in has been based on a U.S. price, the input cost would decline by approximately 6.5 cents per dozen, the charges on imported eggs destined for the Alberta breaker market.

Entry and Exit Conditions

In the nonregulated environment which would exsist in the event of free trade between Alberta and the U.S., entry would be unencumbered and resources would be allowed to allocate freely. However, as the Alberta industry adjusted, some barriers may arise in the form of high initial costs needed to build the facilities required to achieve economies of scale.

Free entry is a basic premise of the United States egg industry and it has allowed for the free movement of resources. However, the degree of vertical integration has made it difficult to enter the U.S. egg industry, especially the processing sector. If the degree of vertical integration increases in Alberta, the same situation may arise.

The high levels of concentration in the Alberta egg processing sector may hinder entrance. In the past, entrance into these areas has not been hindered by government regulation and the level of concentration in these areas has increased.

Product Demand

The quantity of table eggs demanded in Alberta at the farmgate level will increase due to the decrease in the price. As the demand for eggs has been price inelastic at all stages in the market channel, the increase in demand will not offset the decrease in price. This will cause a decrease in the revenue accruing from table egg production.

If the price elasticity of demand for all grades of eggs is assumed to be -0.3, a decline in the 1987 average Alberta farmgate price to the average U.S. farmgate price of 58.078 cents/dozen Canadian (CDN) plus transportation (5.87 cents/dozen CDN[37]) would be a negative percentage change of about 35 percent. The quantity demanded at farmgate would correspondingly increase by only 10.5 percent. Thus, revenues in 1987 would have declined by approximately 11 million dollars.

Access to the United States consuming population would increase the quantity of Alberta eggs demanded. However, the decreasing per capita consumption level in the United States, the high level of vertical integration in the U.S., and the higher cost of production in

[37]Alberta Agriculture, Production Economics Branch, 1987

Alberta make it unlikely that Alberta eggs would move into the continental United States.

Technology

As it is assumed that entry into the Alberta table egg industry will not be hindered by formal structures, the allocation of resources, in the form of new technology would not be hampered. The adoption of new technology which could lower the cost of production would be the only method of keeping in business. In the past this has occurred in the U.S. industry, as firms not adopting efficiency increasing technology have become unable to compete against those firms that adopted such technology.

There should not however, be a substantial investment of technology in the Alberta sector upon the institution of trade. Alberta producers have been adopting new production technology in the last decade, which has resulted in increasing productivity levels.[31] Free trade may cause this technology to be used more intensely in order to achieve some degree of economies of scale.

Product Differentiation

Due to the homogeneous nature of eggs, the amount of product differentiation in the Alberta and U.S. egg industries consists mainly of wholesaler and retailer brand naming and quality standards. The differences in the quality standards may prove to be a hinderance to the flow of product between Alberta and the United States.

Summary

If free trade in table eggs were instituted between Alberta and the United States, elements of the Alberta market may change. The method of price determination, would change from an governmentally administered price to a price which may be a function of the U.S. farmgate price. Due to the integration in the U.S. market eggs produced in Alberta may not be able to enter the United States. Quality differences and producer integration into

[31]AEFMB, Personal Communication, 1987

wholesale may hinder the flow of U.S. eggs into Alberta. However, the potential would still be there. As such, the price level in Alberta would become a function of the U.S. farmgate price, lower than the price level which exited under supply management, and as such may not return to all producers their cost of production, causing a decrease in the gross revenue accruing to the table egg sector. Those producers who would not have their cost of production met by an open market price would be forced to leave the industry. As the majority of quota egg production in Alberta occurs on mixed farm operation, this transition may be eased and the number of producers forced out of agriculture may not be as high. Those producers able to achieve some degree of economies of scale may be able to compete at a lower prices and may be the major source of domestically produced table eggs.

As the Alberta farmgate price decreases, the producers share of retail price would decline only if the retail price does not decline proportionally. This may occur under free trade due to the oligopolistic/oligopsony and the vertical integration present in the wholesale stage. If this occurs, the consumer may not benefit from the lower prices free trade may cause at farmgate.

Other aspects of market structure may be enhanced under free trade. Free entry into production would ensure least cost and efficient production, thus allowing for increased resource allocation. While a decrease in price would increase quantity demanded, because of the inelasticity of demand, the price decrease would outweigh the increase in quantity demanded, causing an overall decrease in total producer revenues. However, if the number of producers decreases under free trade, individual producer revenues may increase.

IV. Summary, Conclusions and Recommendations

A. Review of Objectives

The objectives of this study were 1) to use the industrial organization framework of market analysis to describe the historical and current market aspects of the Alberta and United States table egg sectors, and 2) to assess the impacts free trade in table eggs between Alberta and the United States may have on the Alberta table egg market. The objectives were established in view of the concern raised by the Alberta table egg industry over the actions taken by Canada and the United States in their attempt to establish a free trade area, and in light of a view existing in the international community that institutions within countries allowing quantitative import restrictions should be changed so as to lower or eliminate the level of protectionism in the international community. The United States is a proponent of this view and has put a proposal before the Uruguay Round of GATT negotiations to reform international agricultural trade through the elimination of all agricultural subsidies and import barriers (Warley 1987).

B. Summary of the Market Analysis

Using Bain's (1959) industrial organization paradigm,[39] the historical and current market aspects of structure, conduct, and performance of the United States and Alberta table egg sectors were examined.

Alberta

Since 1969 the production and price of table eggs in the Alberta sector have been regulated by supply management. The numbers of producers in Alberta have been declining while the average size of table egg farms has been increasing. A substantial portion of Alberta's production has been carried out on mixed farms and by Hutterite colonies, with only a small percentage of table egg production by producers specializing in the production of table

[39]Reviewed in Chapter I.

eggs. The majority of purchasers of table eggs at farmgate have been grading stations, whose numbers have also been declining over time while the level of intergration has increased. The degree of concentration has become quite high, with 5 firms handling about 90 percent of domestic production. In Alberta there have been barriers to entry in the form of production quota, which restrict provincial production to a certain level.

The farmgate price of table eggs in Alberta has been based on a national average cost of production survey. Those table eggs declared as surplus by grading stations are purchased by CEMA and sold to the further processors at a price which is based on a Mid-West U.S. price quotation.

The barriers to entry in the Alberta table egg market may have restrained the allocation of resources so that the least cost level of production brought about the achievement of economies of scale has not been achieved. The regulated system has lessened the need for producers to gather information necessary to make production and marketing decisions as these they are made for the producer by the regulating authority. It has decreased the price variability so that price and market risk are reduced. The level of concentration at wholesale may have allowed some wholesalers to accumulate market power, which may give them the ability to affect retail prices.

The United States

The U.S. table egg sector has been characterized by large scale, cost efficient production brought about through the acheivement of economies of scale. The numbers of producers in the U.S. has been declining over time, with the size of production units becoming larger. The concentration of table egg purchasers in the U.S. has increased over time along with the amount of vertical integration. The amount of integration has reached levels so that the majority of production is done under some sort of vertical arrangement (Marion 1986). The amount of initial fixed investment required for starting production may be prohibitive to those who cannot acquire the capital required (Schrader *et al.* 1978). The amount of integration existing between wholesale and retail may make it difficult to enter the wholesale

segment of the table egg sector. The degree of concentration in the further processing stage is such that it has made entry into this stage the most difficult of the sector (Schrader *et al.* 1978).

Prices in the U.S. egg sector have been arrived at in an open market, in the sense that there is no government regulation. The level of concentration in the U.S and the increased amount of vertical integration at the production level has decreased the amount of product which is priced through arms length transactions (Marion 1986).

The adoption of new technology has allowed for the achievement of technically efficient, least cost production. Although production has become more efficient, price variability may have been the cause of increased vertical integration. While these arrangements have increased the operational efficiency of the market by lowering transaction costs and increasing the efficiency of the market chain, the quality of the information carried by the price has been affected (Marion 1986). If the market information carried by the price has become incorrect, non-optimal resource allocation desicions may be made, lowering the pricing efficiency of the market.

C. Conclusions of the Impacts Resulting From Free Trade

If free trade in table eggs were to occur between Alberta and the United States, elements of the Alberta table egg market may be affected. With the assumptions stated in Chapter I kept in mind, the loss of supply management would affect a change in the pricing mechanism of the Alberta market. This would in turn have an impact on the structure and performance of the Alberta market.

If the price in Alberta were to become non-regulated and arrived at in a open market the farmgate price which may exist would be a function of the U.S. farmgate price for table eggs. The historical U.S. farmgate price, in Canadian funds, without the cost of transportation and handling added, has been shown to be less than the historical Alberta producer price and the Alberta cost of production. There are Alberta producers who may have achieved or are in position to achieve economies of scale, thereby lowering their costs of

production to a level which may be recovered by a lower price.

Those producers who may be forced out of the Alberta table egg sector would be those whose costs of production are currently just being met be the CEMA pricing scheme and are not able to lower their cost of production. Those producers who have implicitly allocated a value to the production quota, or may have increased their debt load based on having production quota and a higher market price, may not be able to support their debt load with a lower market price.

For a market to attain optimal levels of performance, it must deliver the quantity and quality of product at the time and place it is desired. If this is accomplished, the market has achieved maximum benefit through efficient allocation of resources (Marion 1986). Changes in the Alberta table egg market may bring it closer to this level of performance.

In any market, access is a key dimension of market performance (Marion 1986). In free trade of table eggs between Alberta and the U.S. were to occur, access to the U.S. market by Alberta would be unrestricted, however it is unlikely that Alberta would be able to move table eggs into it. Quality differences and producer integration into wholesale may hinder movement of U.S. product into Alberta. However, the potential for movement of product will still exsist.

Unrestricted entry which allows for the free movement of resources into and out of an industry is important for new technology and the investment capital needed to aid in its adoption to enter the industry, resulting in increased operational efficiency. The amount of concentration and associated market power may allow existing wholesalers in Alberta to dissuade entrants, not allowing for benefits of increased production efficiency to be passed on to the final consumer.

Price stability is a desirable aspect of performance that may be lost in a competitive environment. The administered price for table eggs in Alberta has been less variable than the farmgate price for table eggs in the United States and the Alberta market price may become a function of the U.S. farmgate price. In order to lessen the risk and uncertainty that Alberta producers may face in a non-regulated market, producers might enter into marketing

arrangements, such as production contracts, ensuring a minimum return for the producer and a supply and lower transaction costs for the wholesaler. While this may increase the operational efficiency of the marketing system, increases in private price negotiations may affect the quality of the information carried by market price and may cause inaccurate market signals to be relayed, lowering the pricing efficiency, allowing for non-optimal resource allocations to be made.

D. Recommendations for Further Research

It is recommended that:

1. A cross sectional, cost of production survey of the Alberta table egg industry be conducted in order to estimate the degree of economies of scale present. This study would also enable more acccurate results as to the out migration which may result from free trade.
2. An investigation into the presence of market power at the wholesale stage in the Alberta table egg market be conducted.
3. A study be conducted to estimate the level of quota value present in the Alberta table egg industry and the degree that Alberta producers depend on it financially.

Bibliography

Agriculture Canada. *Eggs and Egg Products*. Publication 1498/E Communications Branch, Agriculture Canada. Ottawa, Ontario. 1977

----------. *The Poultry Market Review*. Agriculture Development Branch, Annual, 1965-1987.

----------. *The Poultry Market Report*. Agriculture Development Branch, Weekly, 1987.

Alberta Agriculture. *A Cost Analysis of Egg Production in Alberta*. Production Economics Branch, Edmonton, Alberta. 1983-1986

Alberta Bureau of Statistics. *Alberta Statistical Review*. Edmonton, Alberta. First Quarter, 1987.

Alberta Report. *The Atlas of Alberta* Interwest Publications Ltd. Edmonton, Alberta. 1984

Alston, Julian M. "Consequences of Deregulation in the Victorian Egg Industry." *Review of Marketing and Agricultural Economics*. Vol. 54, No. 1. (April 1986) 33-43

Amey, David. "Egg Industry Continues on Its Concentration Course." *Poultry Tribune*. Vol. 91, No. 12. (Dec. 1985) 9-12

Anonymous. "Largest Egg Companies in the U.S.", Watts Publishing. Vol. 91, No.12. (Dec 1985) 24-26

Appelbaum, Elie. and Ulrich R. Kohli. "Canada-United States Trade: Tests for the Small-Open-Economy Hypothesis." *Canadian Journal of Economics* XII, No. 1 (February 1979) 1-14

Arcus, Peter. *Broilers and Eggs*. Economic Council of Canada. Technical Report No. E/I3. Ottawa, Ontario. 1981

Bain, Joe S. *Industrial Organization*. John Wiley and Sons, Inc. New York. 1959

Bank of Canada. *Bank of Canada Review*. Ottawa, Ontario. 1977-198

Barichello, Richard. R. and Catherine Cunnigham-Dunlop. *Quota Allocation and Transfer Schemes in Canada*. Working Paper, Policy Branch, Agriculture Canada. Ottawa, Ontario. 1987

Barichello, R.R. and T.K Warley, "Agricultural Issues in a Comprehensive Canada-USA Trade Agreement." University of Guelph and the University of British Columbia. 1986

Bell, Donald. "Egg Pricing at Farm, Wholesale, and Retail." *Poultry Tribune*. Vol. 92, No. 9. (1986) 4-18

Blair, R.D. and David Kaserman. *Law and Economics of Vertical Integration and Control*. Academic Press. New York. 1983

Blakely, P.K. *The Egg Processing Industry - An Examination of Canadian Egg Marketing Agency Policies Towards Breakers Regarding Pricing and Production*. Agriculture

Canada, Working Paper 13/84, Commodity Markets Analysis Division, Marketing and Economics Branch. Ottawa, Ontario. 1984

Blase, Kenneth. and Sandra Lesene. "Egg and Poultry Price Spreads, 1976-1981." USDA. National Economic Division, Economic Research Service. 1982

Borcherding, Thomas. and Gary W. Dorosh. *The Egg Marketing Board: A Case Study of Monopoly and its Social Cost.* The Fraser Institute. Vancouver, British Columbia. 1981

Breimyer, Harold F. *Economics of the Product Markets of Agriculture.* Iowa State University Press, Ames, Iowa. 1976

Bressler, Jr, Raymond G., and Richard A. King. *Markets, Prices and International Trade.* John Wiley and Sons, Inc. 1970

Buse, R.C. and D.W. Bromley. *Applied Economics: Resource Allocation in Rural America.* Iowa State University Press, Ames, Iowa. 1975

Canadian Egg Marketing Agency. *CEMA Annual Report.*. Ottawa, Ontario. 1986

Canadian Federation of Agriculture. *How Farmers Market Eggs in Canada.* Ottawa, Ontario. 1980

Canada West Foundation. *Putting the Cards on the Table: Free Trade and Western Canadian Industry.* Calgary, Alberta. 1986

Caves, Richard. *American Industry: Structure Conduct and Performance.* Fifth Edition. Prentice-Hall, Inc. Englewood Cliffs, NJ. 1982

Caves, Richard. and M.E. Porter. "Market Structure, Oligopoly, and Stability of Market Shares." *The Journal of Industrial Economics.* Vol. 26. No.4 (June 1978). 289-313.

Chavas, Jean-Paul. *A Quarterly Econometric Model of the U.S. Poultry and Egg Industry.* University of Missouri-Columbia. Ph.D. Dissertation. 1978

Chicago Mercantile Exchange. *Fundamental Factors Affecting Egg Futures.* The Chicago Mercantile Exchange, Chicago, Ill. 1975

Cowling, C., P. Stoneman, J. Cubbin, J. Cable, G. Hall, S. Domberger, and P. Dutton. *Mergers and Economic Performance.* Cambridge University Press. Cambridge, Mass. 1980

Cox, David and Richard Harris. "A Quantitative Assessment of the Economic Impact on Canada of Sectoral Free Trade with the United States." *Canadian Journal of Economics.* Vol 19. No. 3 (August 1986). 337-394.

Curtis, Douglas C.A. "Trade policy to Promote Entry With Scale Economies, Product Variety, and Export Potential." *Canadian Journal of Economics.* Vol. 15. No. 1 (February 1983) 109-121.

Dam, Kenneth W. *The GATT: Law and Economic Organization.* The University of Chicago Press. Chicago, Ill. 1970

Farris, Donald E. and Doris von Dosky. "Market Performance of Poultry Industries Under Different North American and European Market Structures." Contributed Paper presented at the XX International Association of Agricultural Economists, Buenos Aires, Argentina, August 26, 1988.

Fischer, Malcolm R. "A Sector Model: The Poultry Industry of the U.S.A." *Econometrica.* Vol. 23, (1958) 37-66.

Gatt Secretariat. *Proposals Presented to the GATT for Negotiations on Agriculture.* Compiled by the National Center for Food and Agricultural Policy Resources for the Future. Washington, D.C. 1988

Government of Alberta. "Marketing of Agricultural Products Act." *Revised Statutes of Alberta.* Vol. 4 (1980) 3853-3891

Government of Canada. "Farm Products Marketing Act." *Statutes of Canada.* Vol. 1 (1970-71-72) 2041-2064

Gravelle, H. and R. Rees. *Microeconomics.* Longman, London. 1981

Green, Christopher. *Canadian Industrial Organization and Policy.* Second Edition. McGraw-Hill Ryers Ltd. New York. 1985

Hathaway, Dale E. *Agriculture and the GATT: Rewriting the Rules.* Institute for International Economics. Washington, D.C. 1987

Hawkins, M. H. and N. Higginson. "Marketing Research in the Canadian Food Retail and Processing Industry." Presidential Address, *Canadian Journal of Agricultural Economics.* No. 34, 1986.

Heady, Earl O., C.B. Baker, Howard G. Diesslin, Earl Kehrberg, and Sidney Staniforth (editors). *Agricultural Supply Functions - Estimating Techniques and Interpretation.* Iowa State University Press, Ames, Iowa. 1961

Henderson, J.M. and R.E. Quandt. *Microeconomic Theory; A Mathematical Approach.* Third Edition, McGeaw-Hill, New York. 1980

Hernadez-Estrada, Julio. *Estimation of Demand Parameters for Eggs.* North Carolina State University at Raleigh, Ph.D. Dissertation. 1978

Houck, James P. *Elements of Agricultural Trade Policies.* MacMillian Publishing Co. New York. 1986

Hurnanen, R. R. "Vertical Integration and Concentration in the Alberta Broiler Industry." University of Alberta. Unpublished M. Sc. Thesis. 1970

Johnston, J. *Econometric Methods.* Third Edition. McGraw-Hill Book Co. New York. 1984

Jones Jr, H. B. *Commercial Egg Industry: Costs, Practices, and Regional Comparisons.* University of Georgia College of Agriculture Experiment Stations, Research Bulletin 257. 1980

Katz, Micheal. *Financing Production and Surplus in the Canadian Egg Industry.* Working Paper, Policy Branch, Agriculture Canada. Ottawa, Ontario. 1986

Kessel, Rueben. "A Study of the Effects of Competition in the Tax-Exempt Bond Market." *Journal of Political Economy.* Vol. 79, No. 4. (1971) 706-739

Kohls, R.L. and J.N. Uhl. *Marketing of Agricultural Products.* Sixth Edition, MacMillan Publishing Co. Inc. New York. 1985

Koutsoyiannis, A. *Theory of Econometrics*. Second Edition, MacMillian Publishers Ltd. New York. 1977

Lasley, F.A. *The U.S. Poultry Industry , Changing Economics and Structure*. USDA. Agricultural Economic Report No. 502. Washington. D.C. 1983

-------. "Changes in Egg Marketing." *The Poultry Tribune*. Vol. 91, No. 3. (1986) 30-34

Low, R.E. *Modern Economic Organization*. R. D. Irwin Inc. Homewood, Ill. 1970

Loyns, R.M.A. and A.J. Bejleiter. "Vertical Effects of Marketing Board Regulations: The Case of the Poultry Processing Industry." Research Bulletin No. 83-1. Department of Agricultural Economics and Farm Management, the University of Manitoba. 1983

Loyns, R.M.A. and W.F. Lu. *Characteristics of Demand for Eggs in Canada: An Analysis of Cross Sectional and Time Series Data*. Research Bulletin No. 72-3, Department of Agricultural Economics and Farm Management, University of Manitoba. 1972

Marion, B.W. *Vertical Systems Analysis and the Organization of Agriculture*. Occasional Paper ESO 121. Department of Agricultural Economics and Rural Sociology, Ohio State University, Columbus, Ohio. 1972

-------. "Application of the Structure, Conduct, Performance Paradigm to Subsector Analysis." Paper Presented at the NC-117 Beef Task Force, March 11-12, 1976.

--------. *The Organization and Performance of the U.S. Food System*. NC-117 Committee, Lexington Books. Lexington, Mass. 1986

Mason, Robert D. *Statistical Techniques in Business and Economics*. Fifth Edition. Richard D. Irwin, Inc. Homewood, Ill. 1982

Masson, Robert T. and P. David Qualls. (editors) *Essays on Industrial Organization in Honor of Joe S. Bain*. Ballinger Publishing Co. Cambridge, Mass. 1976

McGuckin, Robert. "Entry, Concentration Change, and Stability of Market Shares." *Southern Economic Journal* Vol. 37, No. 3 (January 1972) 363-369.

Neter, John., William Wasserman, and Micheal H. Kutner. *Applied Linear Regression Models*. Richard D. Irwin, Inc. Homewood, Ill. 1983

Reesman, David. "Justification for Regional Pricing." *The Poultry Tribune*. Vol. 91, No. 3. (1985) 24-26

Rhodes, V.J. *The Agricultural Marketing System*. Second Edition, John Wiley and Sons. New York. 1983

Scearce, K. and John Ikerd. "Livestock and Poultry Trade Between the United States and Canada." *Agricultural Trade Between the United States and Canada*. National Public Policy Education Committe. University of Illinois, 1987

Scherer, F.M. *Industrial Market Structure and Economic Performance*. Second Edition, Rand McNally. Chicago, Ill. 1980

Schmitz, Andrew. "Supply Management in Canadian Agriculture: An Assessment of the Economic Affects." *Canadian Journal of Agricultural Economics*. 31,(July 1983) 135-153

Schrader, L.F., H.E. Larzelere, G.B. Rogers, and O.D. Forker. *The Egg Subsetor of U.S. Agriculture: A Review of Organization and Performance.* USDA. NC-117, Monogragh No. 6. Washington, DC. 1978

Shepherd, William G. *The Economics of Industrial Organization.* Prentice-Hall, Inc. Englewood Cliffs, NL. 1979

Slane, T.C., *An Econometric Model for Predicting Monthly Price and Production in the U.S. Egg Subsector.* The Pennsylvania State Universtiy, Ph.D. Dissertation. 1981

Statistics Canada. *Consumer Prices and Indexes.* Publication 62-010, Quarterly. 1965-1986.

----------. *Farm Cash Receipts* Publication 21-001, Monthly, 1965-1986

----------. *Production of Poultry and Eggs,* 23-202, Monthly, 1987.

---------- *Quarterly Estimates of the Population for Canada, The Provinces and the Territories.* Publication 91-001, Quarterly, 1976-1986.

Stigler, G.L. "The Division of Labor is Limited by the Extent of the Market." *Journal of Political Economy* (1951) 185-195

St.-Louis, R. "A Position-Research Note on Vertical Integration in the Quebec Hog Sector." Universite' Laval, Quebec City, Quebec.

St.-Louis, R. and Yvon Proulx. "Canadian Supply Managed Agricutlural Sector Revisited." A paper presented at the anuual meeting of the American Agricultural Economics Association and the Canadian Agricultural Economics and Farm Management Society and the Association of Environmental and Resource Economists. Michigan, 1987.

Storey, Gary. "U.S.-Canada Free Trade: The Issues and Commodity Implications." University of Saskatchewan, Saskatoon, Saskatchewan. 1986

U.S.D.A. *Agricultural Statistics.* Economic Research Services. Washington D.C. 1981-198

---------. *Agricultural Outlook.* Economic Research Services, Washington D.C. 1965-1987.

---------. *Livestock and Poultry Situation and Outlook Report.* Economic Research Service, Washington D.C. 1981-1988

---------. *Poultry and Egg Situation.* Economic Research Service, Washington D.C. 1965-1982.

Veeman, Michele M. "Social Cost of Supply Restricting Marketing Boards." *Canadian Journal of Agricultural Economics.* 30 (March 1982) 21-37

---------. "Marketing Boards: The Canadian Experience." A paper presented at the anuual meeting of the American Agricultural Economics Association and the Canadian Agricultural Economics and Farm Management Society and the Association of Environmental and Resource Economists. Michigan, 1987.

Warley, T.K. "Canadian Agriculture in Future GATT Negotiations." University of Guelph, Guelph, Ontario. 1985

------. "Linkages Between Bilateral and Multilateral Negotiations in Agriculture." A paper

presented at the anuual meeting of the American Agricultural Economics Association and the Canadian Agricultural Economics and Farm Management Society and the Association of Environmental and Resource Economists. Michigan, 1987.

------. "Development in Agricultural Trade Policy: Implications for Canada." Paper presented at Accent '87: Market Perspectives for Grains, Oilseeds, and Livestock. Edmonton, Alberta.

Wonnacot, Paul. *The United States and Canada: The Quest for Free Trade: An Examination of Selected Issues.* Institute for International Economics. Washington D.C. 1987

Appendix A

Estimation of the Slopes of Trends Presented in Chapter II.

To examine the trend of certain variables in the analysis, a straight line least squares linear-trend equation was estimated for the specific data series. The form of the equation was:

$$Y_p = \alpha + \beta X$$

where:

1. Y_p is the projected value of the Y variable for a selected X variable.
2. α is the Y-intercept.
3. β is the slope of the trend line, and
4. X is the value of the independent variable, trend (time).

This method gives the best fitting line for the data series (Mason 1982). The slopes of the linear trends, can be used as an indicator of the direction the data is moving, thus a positive slope is indicative of an upward trend. The slopes, which are presented as a trend variable throughout the thesis, are presented here in Tables 1, 2, 3, and 4 along with the associated t-statistic. The t-statistic, if larger than the 95 percent significance level, indicates a signifcant trend. The significant t-statistic, at 95 percent confidence level, for the associated degrees of freedom are:

1. Significant t(.05), 8 degrees of freedom = 2.306
2. Significant t(.05), 9 degrees of freedom = 2.262
3. Significant t(.05), 10 degrees of freedom = 2.228

Source: Mason., Robert D., 1982. *Statistical Techniques in Business and Economics.* Fifth Edition, Richard D. Irwin, Inc.

Table 1: Slopes of the Trend and t-Statistics of Variables in Table II.1

Variable	Slope	t-stat
Quota Producers	-7.58	-7.51
Exempt Producers	-18.55	-1.99
Quota Birds	-8,204.10	-1.26
Exempt Birds	-8,437.70	-1.495
Quota Birds/Farm	130.85	3.56
Exempt Birds/Farm	-3.05	-0.61
Degrees of Freedom = 10		

Table 2: Slopes of the Trend and t-Statistics of Variables in Table II.3

Variable	Slope	t-stat
Breaker Surplus	299,820	7.23
Interprovincial Imports	631,570	8.23
Interprovincial Exports	198,940	3.20
International Imports	5,537	1.11
International Exports	-878	-1.73
Trade Deficit	437,170	5.037
degrees of Freedom = 8		

Table 3: Slopes of the Trend and t-Statistics of Variables in Table II.4

Variable	Slope	t-stat
Sold for Consumption	219,010	1.143
Producer Consumption	-145,960	-9.53
Total Trade Deficit	501,840	5.23
Albert Population	54,828	9.08
Alberta/Capita Consumption	-0.275	-3.20
Canadian/Capita Consumption	-0.19	-4.67
Degrees of Freedom = 8		

Table 4: Slopes of the Trend and t-Statistics of Variables in Table II.6

Variable	Slope	t-stat
Production	25.65	2.013
Trade Surplus	-1.62	-0.488
Population	2.37	134.64
Total Egg Consumption	-4.78	-0.497

Degrees of Freedom = 9

Appendix B

Estimation of Farmgate Demand For Eggs in Alberta

Structural Equation

The final demand for a product is the aggregation of all individual consumer demand curves for the product in question and the demand at any level in the marketing chain is derived form this demand (Buse and Bromley, 1975). As such, the demand developed is a producer level demand relation.

Loyns and Lu (1972) and Hernandez-Estrada (1978) point out that empirical evidence of any substitutes and compliments for eggs is unclear. Therefore these aspects of demand are left out of this analysis. The general form of the farm level demand for eggs in Alberta can be expressed as:

$$P_t = f(Q_t, US_t, F_t, B_t, AEP_{t-1}, T, U_t) \quad (2)$$

which can be expressed linearly as:

$$P_t = \beta_0 + \beta_1 Q_t + \beta_2 US_t + \beta_3 F_t + \beta_4 B_t + \beta_5 AEP_{t-1} + \beta_6 Y_t + \beta_7 T + U_t \quad (3)$$

where:

1. β_0 = constant;
2. t = 1,2,...22 representing the years 1965-1986;
3. P_t = annual average price for Grade A Large eggs received by producers, at registered grading stations in Alberta, deflated by the Consumer Price Index, (1981 dollars);
4. Q_t = receipts of Grade A Large eggs in Alberta at registered grading stations, expressed as per capita (Alberta) receipts;
5. US_t = annual average all grade farmgate price for eggs in the United States, deflated by the U.S. Consumer Price Index for all urban consumer goods, (1981 U.S. dollars);
6. F_t = annual average of monthly frozen egg stocks, in kilograms per capita (Canada);
7. B_t = annual average of eggs broken per month, all grades, dozens per capita (Canada);
8. AEP_{t-1} = the Alberta egg price, lagged one period.
9. Y_t = disposable income per capita in Alberta.
10. T = a time trend variable, and

11. U_t = residual error term assumed to be randomly distributed over years.

The rational for choosing each variable is as follows:

The price of Grade A Large eggs: The price Grade A Large eggs is used as a proxy for the price of all grades. It is used for several reasons. It is based on the average cost of production, which is assumed to represent the actual average cost of producing (COP) a dozen eggs in Alberta, given the production process in place. The price for the other grades is set so that they are all sold within Alberta, without trade to other provinces, if possible. The prices are deflated by the Canadian Consumer Price Index 1981 dollars.

Quantity Demanded: This variable is represented by the amount of Grade A Large eggs delivered by producers to registered grading stations in Alberta. The receipts (deliveries) of Grade A Large eggs in Alberta represents 50 to 55 percent of all receipts.[40] To negate any changes in population, this variable was expressed on a per capita (Alberta) basis. The theory of demand indicates a negative or inverse relationship between the price of a commodity and quantity, thus β_1 will be less than zero.

United States Farmgate Price: This variable would be considered very important if Alberta and the United States were presently in a competitive trade position. Due to the import quota's established through the power of GATT, Article XI, the United States is not a source of potential imports. However, as eggs can move relatively freely into the United States, it is a potential export market. It is expected that the price for Alberta eggs will move in the same direction as the U.S. price, i.e. $\beta_2 > 0$.

Frozen Egg Stocks: As stocks of eggs are not kept[41], stocks of frozen egg product is used as a measure of egg inventories. It is hypothesized that, in perfect competition, frozen egg stocks will be affected mainly by the demand for processed egg product. Thus if the demand for egg product is increasing, frozen egg stocks are decreasing because fresh egg product is not available, thus increasing breaker demand for eggs, which increases table egg prices, causing

[40]Agriculture Canada. *Poultry Market Reveiw*, 1965-1986.
[41]Eggs not sold by grading stations in one week are sold to breakers.

the variable to move inversely to the price of eggs, i.e. β_3 will be less than zero. It is expected that frozen egg stocks will have a minor affect on the demand for eggs as the majority of eggs sold to breakers are under grades, and the nature of the CEMA central pricing scheme, which may distort the market signals. Because of the concentrated nature of the breaker market, and due to data limitations, this variable is expressed on a Canadian per capita basis instead of on a provincial basis (Alberta).

Egg Breakages: For the same reasons as frozen egg stocks, the amount of eggs broken in registered plants is not expected to have much influence on demand. As with the previous variable, data is expressed on a Canadian per capita basis and is expected to act inversely to price, i.e. β_4 will be less than zero.

Lagged Egg Prices: Loyns and Lu (1972) hypothesized that egg purchases by consumers had a habitual aspect which may influence the demand at the farm level. They found this variable to strengthen the statistical relationship, thereby improving the results. This variable is expected to move in the same direction as price, i.e. $\beta_5 > 0$.

Disposable Income: The theory of demand tells us that the constraining factor on the consumers ability to maximize utility is the budget constraint. This is represented by disposable income and is expressed here on a per capita basis to eliminate population changes and is deflated by the Canadian Consumer Price Index, 1981 dollars. It is expected that the current price of eggs will move in the same direction as income, if eggs are normal goods, i.e. $\beta_6 > 0$.

Time Trend: The time trend variable was entered to pick up any systematic movements in the consumption of eggs. It is expected to behave such that β_7 will be less than zero.

Estimation Results

The primary empirical results of the ordinary least squares estimation are given in Table 1. The coefficient of determination, R^2, is 87.25 percent, that is, the explanatory variables explain 87.25 percent of the variation in Alberta prices. The standard error of the estimate is 0.067 or 6.7 cents per dozen. The Durbin-Watson statistic of 2.51, which at a 95

percent confidence level, indicates an indeterminate amount of autocorrelation among the error terms. Thus the estimates can still be considered unbiased and efficient. A problem does occur with the signs of some of the estimated coefficients, which may indicate the presence of multicollinearity among variables over time. The correlation between variables was estimated and several variables had a somewhat high correlation over time. The highest correlation was between the time trend and egg breakages, income and frozen egg stocks (Table 2). The time trend and the U.S. farmgate egg price also had a high correlation.

As the standard errors of the variables are not abnormally high, and the estimated coefficients of the major explanatory variables did not change dramatically when these variables were entered separately into the regression, the level of suspected multicollinearity does not seriously affect the estimates, its presence may be tolerated, (Koutsoyiannis, 1980), and the variables left in the relation. The "correctness" of a derived relationship can be seen by its ability to estimate values of the dependent variable. If the estimated values are not decidedly different from the actual values, the relation can be said to have a relatively good forecasting ability. Figure 1 shows the closeness with which the estimated demand relation predicts the annual average price for eggs in Alberta.

Income is insignificant as was expected, and this is agreement with Loyns and Lu (1972). The egg breakage variable was also not significant, indicating that egg breakages have no effect on the price of Grade A Large eggs. In reality, since CEMA has provided the breaking sector with a central price scheme which subsidizes the lower price at which eggs are sold to breakers, (Blakely 1984), there is no influence by the breakers activities on farm level demand. The coefficient for the frozen egg stock variable was not of the correct sign, which may have been caused by the multicollinearity present or by the possible distortions caused by CEMA's policy of central pricing.

The variables which contribute to the function are the quantity of Grade A eggs delivered, the price of farmgate eggs in the United States and the lagged Alberta egg price. The lagged price indicates the habitual behavior of egg purchases. The United States price moves in a similar fashion to the Alberta egg price possibly because it is an alternative market

Table 1: Estimation Results

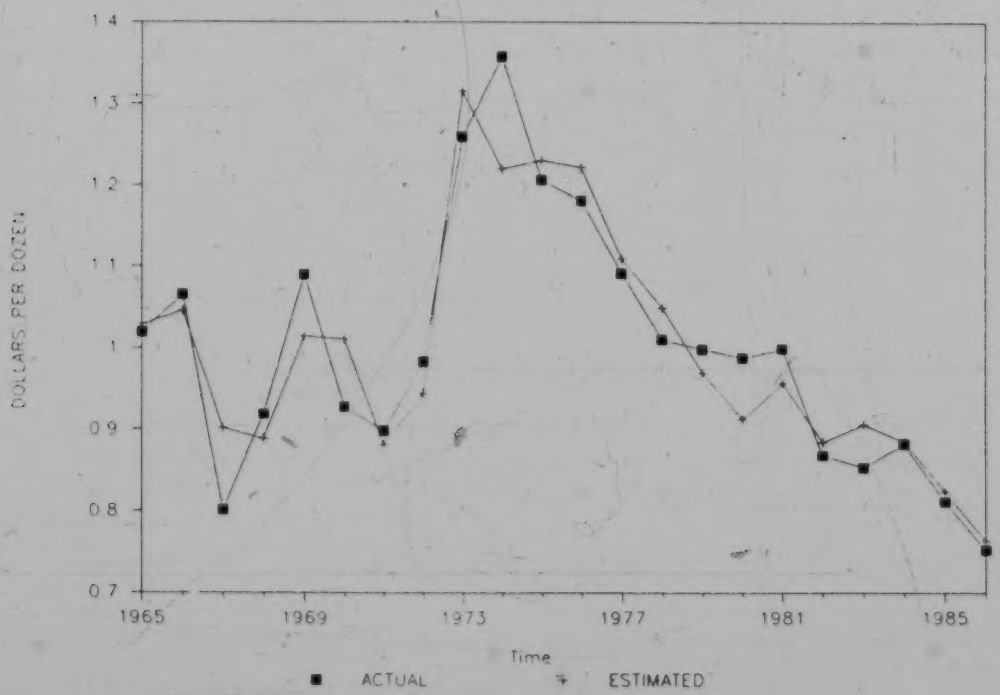
R^2=0.873, Standard Error of the Estimate=0.067, F=13.69

Variable	Coefficient	Standard Error	t-ratio	Elasticity •
Q	-5.8020	4.2859	-1.3539	-0.29044
USEP	0.90604	0.1003	7.5485	0.71771
AEP_{t-1}	0.34226	0.0159	5.7596	0.33053
INCOME	0.0009	0.0008	1.0981	0.06814
CFE	3.4002	1.7526	1.9401	0.07968
EB	-4.2893	15.272	-0.28085	0.04939
A	0.01268	0.010255	2.6164	53.093
CONSTANT	-52.862	20.097	-2.603	-52.949

Durbin-Watson=2.5101
Significant t(.05)=1.761, t(.1)=1.345
Significant F(.05)=2.74

• Elasticity at the Means

Figure 1: Estimated Price vs Actual, Grade A Large Eggs, Alberta. 1965-1986



Source: Agriculture Canada, *Poultry Market Review*. 1965-1986

Table 2: Correlation Matrix of Variables

AEP	1.0						
USEP	0.62	1.0					
AEP_{t-1}	0.35	-0.25	1.0				
A	-0.31	-0.82	0.18	1.0			
INCOME	-0.29	-0.72	0.11	0.88	1.0		
CFE	0.29	0.53	-0.09	-0.73	-0.72	1.0	
EB	-0.35	-0.85	0.21	-0.93	0.75	-0.62	1.0
	AEP	USEP	AEP_{t-1}	A	INCOME	CFE	EB

for Alberta eggs or due to fluctuations in the cost of production due caused by price of feed. Corn is used in feed rations in the U.S. and Alberta. As feed makes up a large portion of the cost of production, the movements of egg prices in both regions may be related. The U.S. price is also influential in determination of the price breakers purchase their eggs, as the formula price arrived at by CEMA is based on the U.S. price. The quantity variable was significant at a lower level, indicating a lesser degree of influence on price. This may be a reflection on the supply control policies that were in place over the period of study.

Limitations

There are several aspects and assumptions which may limit this analysis. The demand for eggs is estimated implicitly assuming a perfectly competitive market. This is not so in Alberta because of the supply management policies in place. The prices used are not true market prices but are distorted by the levy and the conversion factor. The production of eggs in also limited and this may also affect the estimation of the demand. The study does not take into account possible quota rents, which has been argued to be the difference between costs in regulated and non-regulated markets (Alston, 1986). The pricing policies of CEMA towards the breakers and towards the inhibition of inter-provincial trade may also have had an affect on the demand for eggs at the farm level.

Appendix C

Abuse of Import Privileges

Eggs and egg product[42] have been imported into Canada on a restricted basis. This restriction has been allowed under the General Agreement on Tariffs and Trade (GATT), Article IX:2(c)(i), which exempts import restrictions of agricultural or fisheries products from GATT's general prohibition on quantitative restrictions. Article IX:2 also stipulates that imports will not be reduced relative to domestic production, as compared with that proportion of production which may have been imported had there been no restrictions. Thus, when global imports were implemented, they were allocated to countries at historic levels. At that time, Canadian imports of shell eggs amounted to 0.675 percent of Canada's egg production. Therefore the amount of table (shell) eggs which could be imported are 0.675 percent of Canada's production in the previous year (Table 1).

The right to import eggs was also allocated on an historic basis. Those companies in Canada, usually grading stations, who had historically been importing eggs or egg product were given import licenses by the Canadian government. Therefore, only these entities were given import quotas, which are divided into monthly allotments.

Along with the global import permits, the importing agencies were allowed to apply for supplemental import permits once the global import quotas had been filled and the Canadian egg sector was in short supply. The importer was then required to apply to the Special Trade Relations Office (STRO) for the supplemental import license. The applicant must indicate the desired quantity and quality of egg or egg product required. Once this was done, STRO contacts the Canadian Egg Marketing Agency (CEMA) and CEMA was given 48 hours to find the desired product in Canada. In addition, the product must have been deliverable within 5 days. If such product was available, the supplemental import license was not granted.

[42]Dried and frozen forms.

Table 1: Import Restricitions in Place for Eggs, 1987

Commodity	unit	Percent*
Shell eggs	doz.	0.675
Frozen eggs	lb.	0.415
Dried eggs	lb.	0.615

* Percent of previous years domestic production.

Source: AEFMB, Personal Communication, 1987

The Problem

It has become known that companies holding the import permits have been not been using the right to import eggs in the manner intended. The companies which were granted the license were renting out that portion of the import quota which they did not need. These companies then had the right to fill the global import quota. However, the timing of the importation was of no importance, allowing eggs to be imported when domestic demand did not exceed domestic supply. The imported eggs, purchased at lower prices, were sold in Canada as Canadian product at a substantially higher price, into either the retail market or declared as surplus.[43] Surplus eggs were purchased by CEMA at the price the grading stations purchased the eggs, plus a $0.075 per dozen handling charge. The CEMA then sold the eggs into the domestic processing (breaker) market at a price based on the cost of U.S. landed eggs. If the surplus eggs were in amounts that the domestic processor market could not use, the surplus was sold into the export market. Thus, if a grading station imported eggs without the intention of ever marketing them, the extra profit generated from this activity amounted to the difference between the U.S. price and the guaranteed CEMA price, less import and transport costs, plus the handling charge paid by CEMA.[44]

[43]The price for eggs in Canada is set by CEMA and is based on the cost of producing one dozen eggs in each province.

[44]The handling charge may become a benefit as it is meant to cover the costs the grading stations incur trying to market eggs to retailers. If this was never done, the handling costs are nil.

Further abuse arises when the supplemental import rights were not used as intended. If the global import quotas were not filled during times of excess demand as intended, the supplementals were used. Further misuse may occur if the importer knew that because of existing production cycles, a certain grade of eggs would be in low supply in Canada. The importer would then apply for a supplemental import quota for that grade in an amount that the Canadian producers could not fill, even if there was no demand for that product, thus creating an artificial demand for that product. Again, the importer benefited as the imported price was lower than the guaranteed price in Canada. This type of activity may have aided in raising the total amount of eggs imported to levels greater than the historical level of 0.675 percent. Table 2 indicates that the average amount of imported eggs from the U.S. over the last 5 years has been 1.43 percent of the previous years production, ranging from 0.885 to 2.04 percent. These imports alone were greater than the allowed global import levels.

Effects

Two groups have been affected by the actions of those misusing the import system, the consumers and producers of eggs. The Canadian system of supply management has attempted to manage domestic production so that supplies equal the demand for eggs. However because of seasonal production cycles, this has not always occur and for this reason the import system was created. This system did not intend for imported eggs to be marketed as Canadian product. When this has been done, it has acted as a tax on consumers and producers of eggs, with the generated revenue going to the importers of eggs. If eggs were imported when they were not required in Canada, they have been sold into the processing sector. As explained previously, CEMA takes a loss when selling eggs into this market. This loss was made up by a consumer levy[45], therefore the more surplus eggs sold into the domestic

[45] A levy of $0.095 per dozen eggs is applied to every dozen eggs sold through grading stations and by registered quota holding producers in Alberta and is collected by the Alberta Egg and Fowl Marketing Board (AEFMB). The levy is subtracted from the reciepts paid to all those selling eggs through grading stations. Quota holding producers who are not selling through grading stations are expected to pay the levy. Of the 9.5 cents collected, 2 cents is required to make up the loss of removing surplus eggs into the export market. The remaining 7.5 cents per dozen, although taken off the producer receipts, is replaced through the Cost of Production (COP) formula, which includes this amount as a cost of production. As the

Table 2: Imports of Eggs, U.S. Origin

Year	Canadian Production	Imports, U.S.	Percent
1982	493.5*	7.056*	1.42#
1983	504.8	4.371	0.885
1984	489.5	5.855	1.16
1985	487.9	9.998	2.04
1986	491.4	7.938	1.62
Mean		7.0422	1.43

*= millions of dozen
= expressed as a percentage of the previous years production

Source: Agriculture Canada, Poultry Market Review, 1982-1986

breaker market, the more the cost to the consumer increases. If the amount of surplus eggs was such that they have to be sold in the export market, the producer lost. Eggs which CEMA could not sell to the domestic breakers were sold in the export market. As with the domestic breaker market, these eggs sold at a loss. This loss was taken up by the producer, who has a levy of $0.020 per dozen eggs sold deducted from his receipts. Thus if the amount of eggs sold into the export market increases, the cost to the producer increases.

---

[45](cont'd) Canadian Egg Marketing Agency (CEMA) sets the price of eggs based on the COP, the consumers are essentially paying this. This 7.5 cents is allocated for :
1. Operating costs of the AEFMB (2.0 cents/dozen).
2. Opertaing costs of CEMA (2.5 cents/dozen).
3. Surplus egg removal, domestic market (3 cents/dozen).